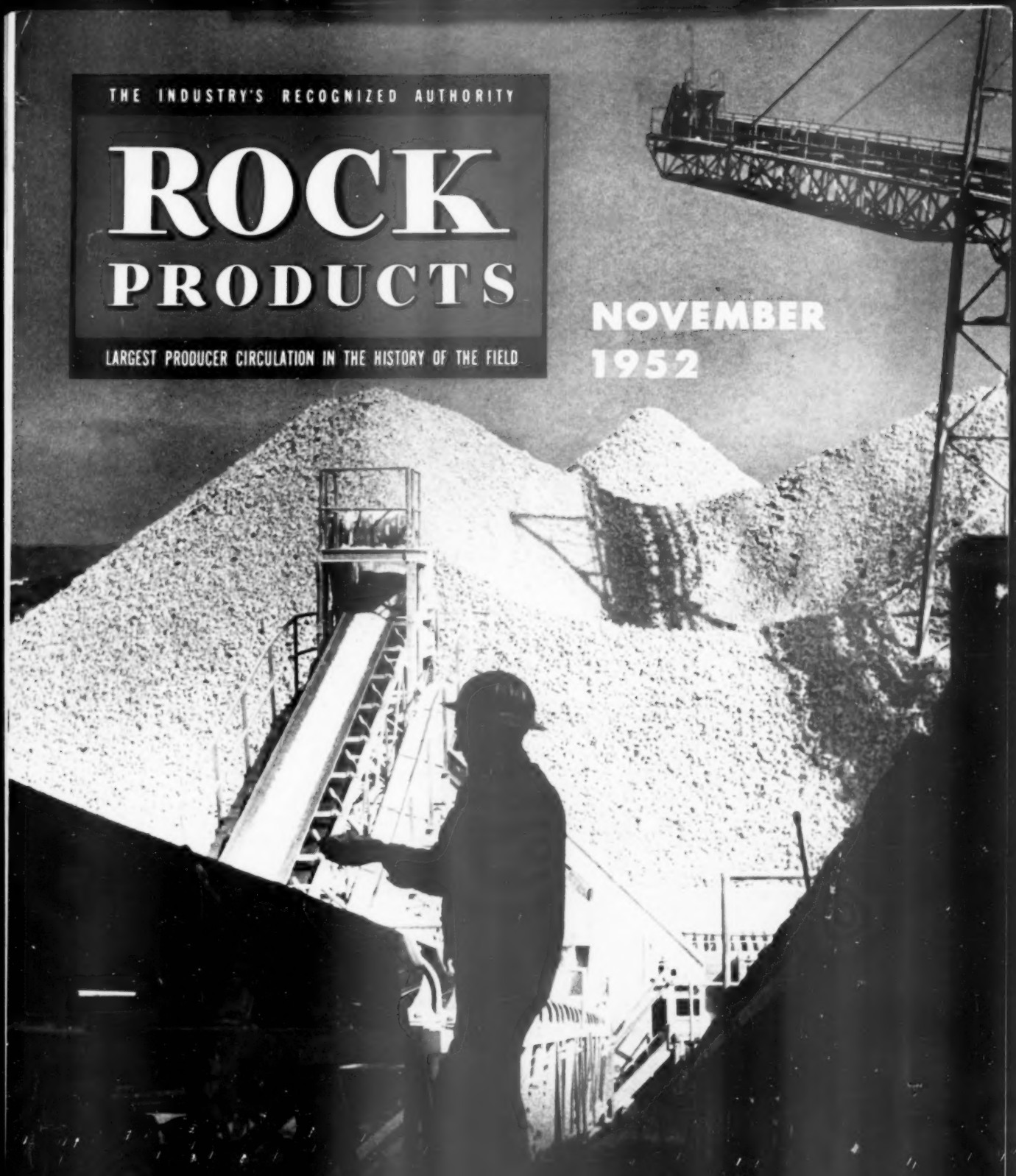
THE INDUSTRY'S RECOGNIZED AUTHORITY

ROCK PRODUCTS

LARGEST PRODUCER CIRCULATION IN THE HISTORY OF THE FIELD

NOVEMBER
1952

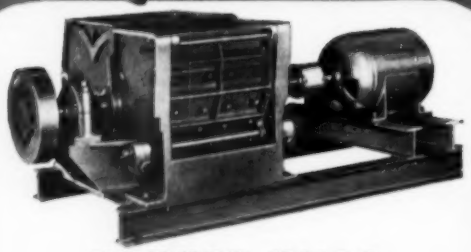


Dolomite plant of Kaiser Aluminum & Chemical Corp. at Natividad, California

★Crush It!
★Grind It
★Separate It

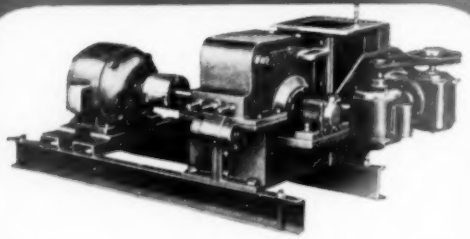
Do It Better, Faster And At Less Cost With...

WILLIAMS



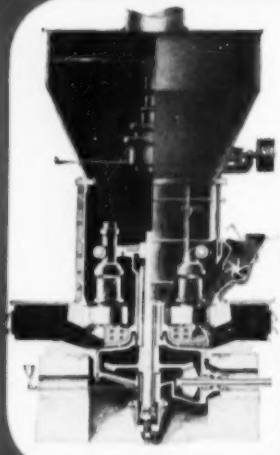
HAMMER MILLS

For heavy duty crushing or grinding of virtually any mineral or chemical — Williams builds them to do *a complete job in one operation!* Primary and secondary crushers are unnecessary — extra foundations, conveyors, other equipment are eliminated! You can save up to 75% on initial investment — up to 50% on grinding costs with the right Williams Hammer Mill!



HELIX-SEAL HAMMER MILLS

For cleaner, safer dustless grinding of dry materials — or non-clogging, accurate grinding of wet, sticky or greasy materials — to finenesses of 100 to 325 mesh. Combines the advantages of a hammer mill with closed-circuit screw-type feed. No separators, fans or cyclones required. Available with steam or water jackets. Low investment — inexpensive to install and operate.



ROLLER MILLS
WITH AIR SEPARATION

For accurate, uniform pulverizing or blending. Instantly adjustable to finenesses down to 400 mesh, even micron sizes. Dries and grinds simultaneously. Automatic, self-adjusting feed. Many other exclusive engineering and construction features. Williams Roller Mills have set new standards for product quality, output and economy.

OTHER WILLIAMS EQUIPMENT

★ *IMPACT and DRIER MILLS*
★ *AIR SEPARATORS*
★ *VIBRATING SCREENS*
★ *COMPLETE "Packaged" PLANTS For Installation In Existing Buildings*

At Your Service

WILLIAMS TESTING LABORATORY

Consult Williams on any grinding, crushing, shredding or separation problem, no matter what the material. The most complete testing and research facilities are available without cost or obligation. Simply furnish enough raw material for a test run, and a sample or description of the finished product desired.

WILLIAMS PATENT CRUSHER & PULVERIZER CO.
800 St. Louis Avenue — ST. LOUIS 6, MO.

WILLIAMS

CRUSHERS — GRINDERS — SHREDDERS

OLDEST AND LARGEST MANUFACTURER OF HAMMER MILLS IN THE WORLD

No ONE chain serves every purpose

LINK-BELT offers the right chain

. . . engineered for your requirements

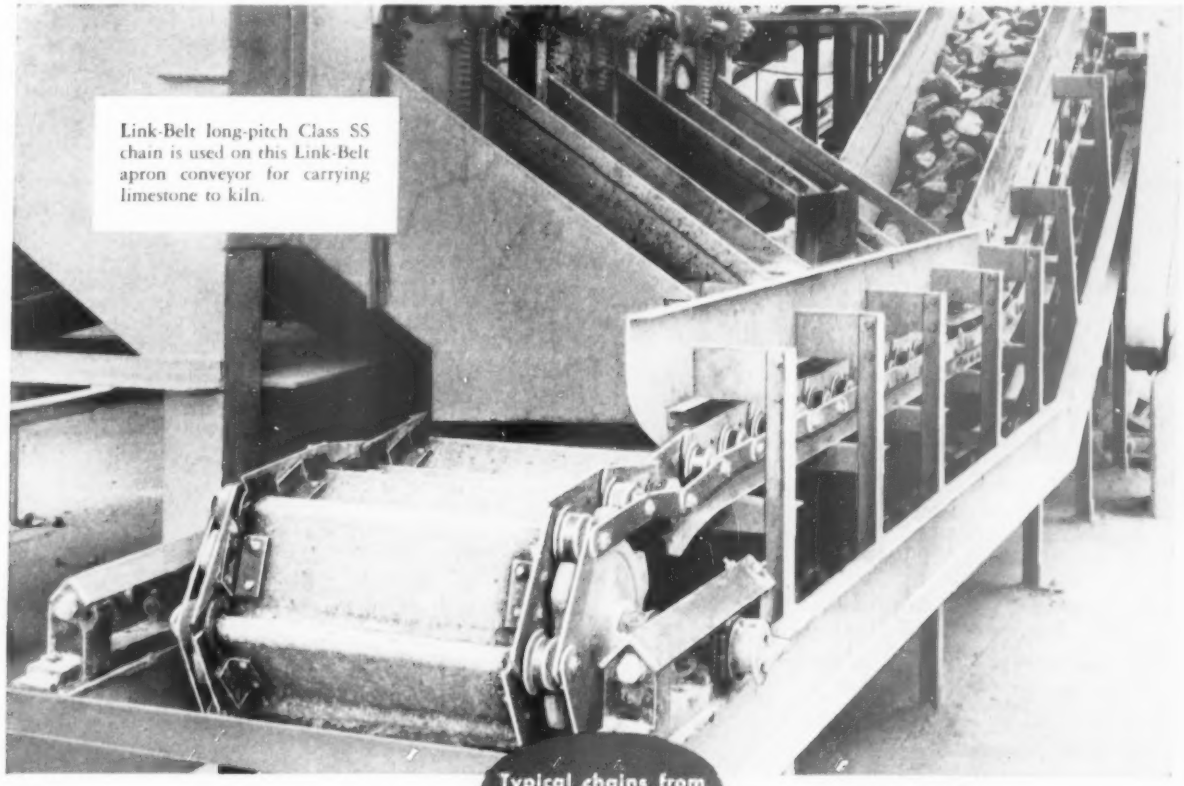
Don't settle for a "cure-all" chain to handle every job. Different types of chain have different characteristics. That's why Link-Belt makes a complete line of chains. Our engineers can recommend the correct type of chain to fit your particular needs . . . the one that does your job best.

Equally important is your assurance that *any* chain with the Link-Belt name will give you longer chain life. Accurate control of raw materials and processes . . . plus manufacturing refinements add up to the highest standards.

LINK-BELT COMPANY: Chicago 9, Indianapolis 6, Philadelphia 40, Atlanta, Houston 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8, Springs (South Africa), Sydney (Australia). Offices, factory branch stores and distributors in principal cities. 32,701-G

LINK-BELT

CHAINS AND SPROCKETS



Link-Belt long-pitch Class SS chain is used on this Link-Belt apron conveyor for carrying limestone to kiln.

Typical chains from the complete LINK-BELT line

Class SS bushed roller chain with straight sidebars—for practically any conveying or elevating service.

Class C combination chain—popular, durable, low cost design for elevators and conveyors.

Class SS bushed roller chain with offset sidebars—for heavy drive service at moderate speeds.

Class 800 lev bushed chain—for heavy duty, severely abrasive conveying and elevating.

NOVEMBER, 1952 THE INDUSTRY'S RECOGNIZED AUTHORITY VOL. 55, No. 11

Bror Nordberg
Editor

Nathan C. Rockwood
Editorial Consultant

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To Subscribers—Date on wrapper indicates issue with which your subscription expires. . . In writing to have address changed, give old as well as new address.

Only B. F. Goodrich makes the grommet belts that cut costs 20 to 50%!

Save 3 ways! Investigate today! Write or mail coupon

You save belt costs because belts last longer, save production costs because machines keep running with fewer interruptions, save maintenance costs because they need less attention.

Patented grommet belts by B. F. Goodrich represent the only basic change since invention of the V belt. Belts last 20 to 50 per cent longer, depending on service. (The more severe the service, the greater the increase over ordinary belts.) Grommet belts have more rubber; they're more flexible, give better grip, less slip.

What is a grommet?

A grommet is like a giant cable except that it's *endless*—a cord loop built up by winding heavy cord on itself. There is no overlapping cord *section* as in all ordinary belts. Most belt failures occur in these sections where cords overlap!

All cords put to work

Each of the two grommets and every part of a grommet carry their share of the load. In ordinary belts under high tension the center cords "dish" because tension is greater near the driving faces. Dished cords are doing less work, not pulling their share. Grommet belts have no center cords, there is no dishing—therefore much more strength in proportion to cord volume—and less stretch. Grommet belts stretch, on an average, only about one-third as much as ordinary belts.

Better grip, less slip

Grommet belts have more rubber in relation to belt size. Without any stiff overlap, they're more flexible, grip pulleys better. Size for size, grommet belts give ⅓ more gripping power, pull heavier loads with a higher safety factor. Because there is less slip, there is also less surface wear.

Send for proof

Send the coupon for a set of reports telling users' experiences and showing actual installations where grommet belts outlasted all others. Some typical cases:

"... within a few days ordinary belts had stretched ... After six months of 24-hour-a-day service BFG grommet belts haven't stretched at all ..."

"Ordinary belts lasted only 5 or 6 weeks ... B. F. Goodrich grommet belts are in their sixth month of service ..."

"Previous belts suffered from shock loads, wore out fast ... BFG grommet belts have been in service 2 years with no shut-downs..."

There are hundreds of cases like these.

They cost no more

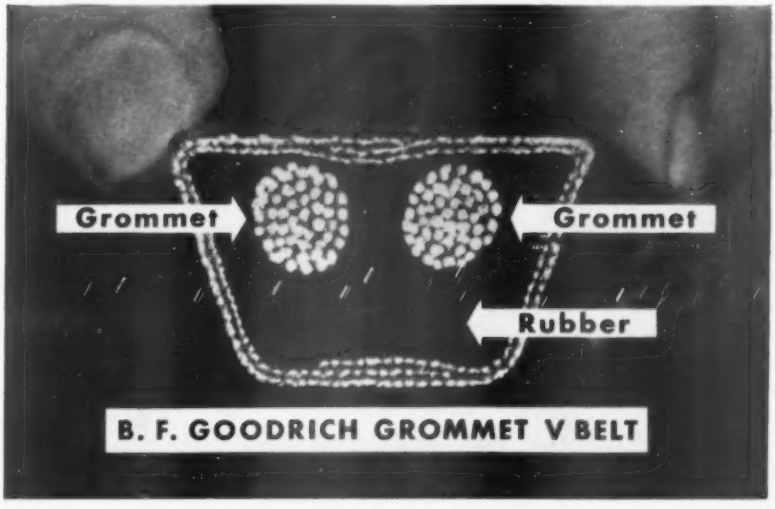
BFG grommet belts cost not one cent more than others. The savings they make for you are clear profit. They are made in C, D and E sections. They are patented by B. F. Goodrich. No other V belt is a grommet belt (U. S. Patent No. 2,233,294).

Write, send the coupon or see your B. F. Goodrich distributor. (He will show you his "X-ray" belt that shows the grommet construction clearly.)

Grommet V-Belts BY

B.F.Goodrich

FIRST IN RUBBER



The B. F. Goodrich Company
Dept. RP-11
Akron, Ohio

☐ Send set of reports telling users' experiences and showing actual installations proving that B. F. Goodrich grommet belts outlast all others.

☐ Have distributor show me the "X-ray" belt that shows how B. F. Goodrich grommet belts are made.

Name_____

Firm Name_____

_____

Street Address_____

City_____

State_____

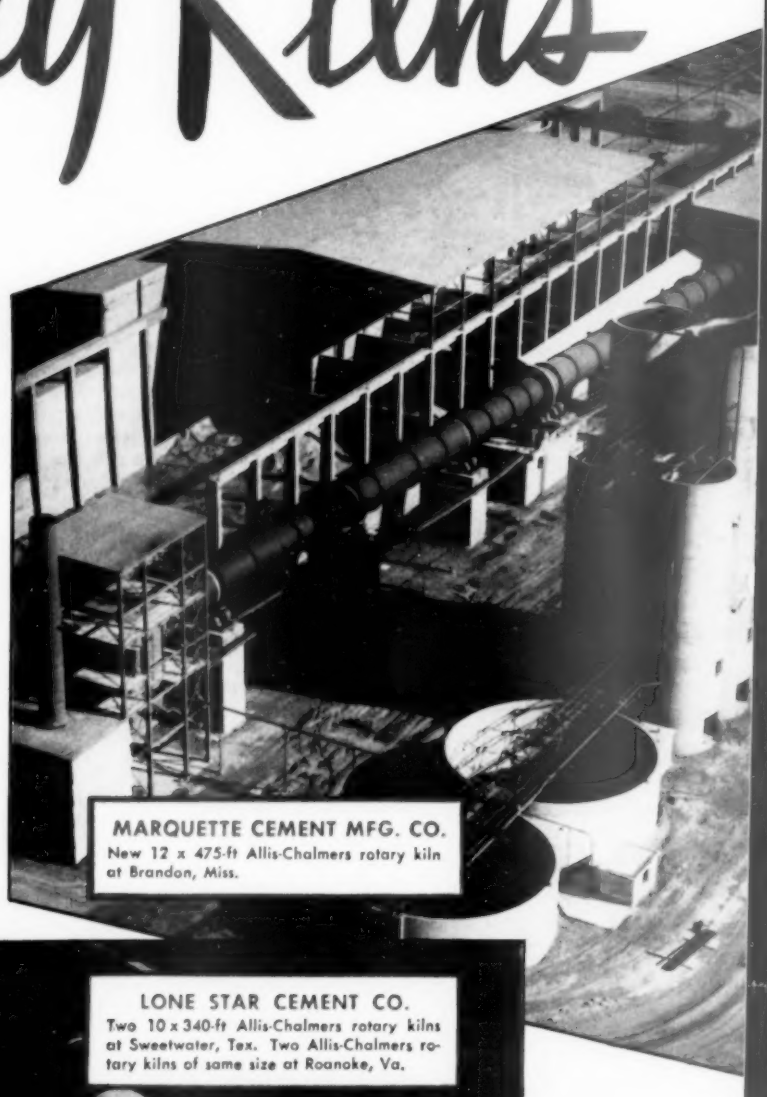
ALLIS-CHALMERS

Rotary Kilns

THE CHOICE OF LEADING U. S. CEMENT PRODUCERS

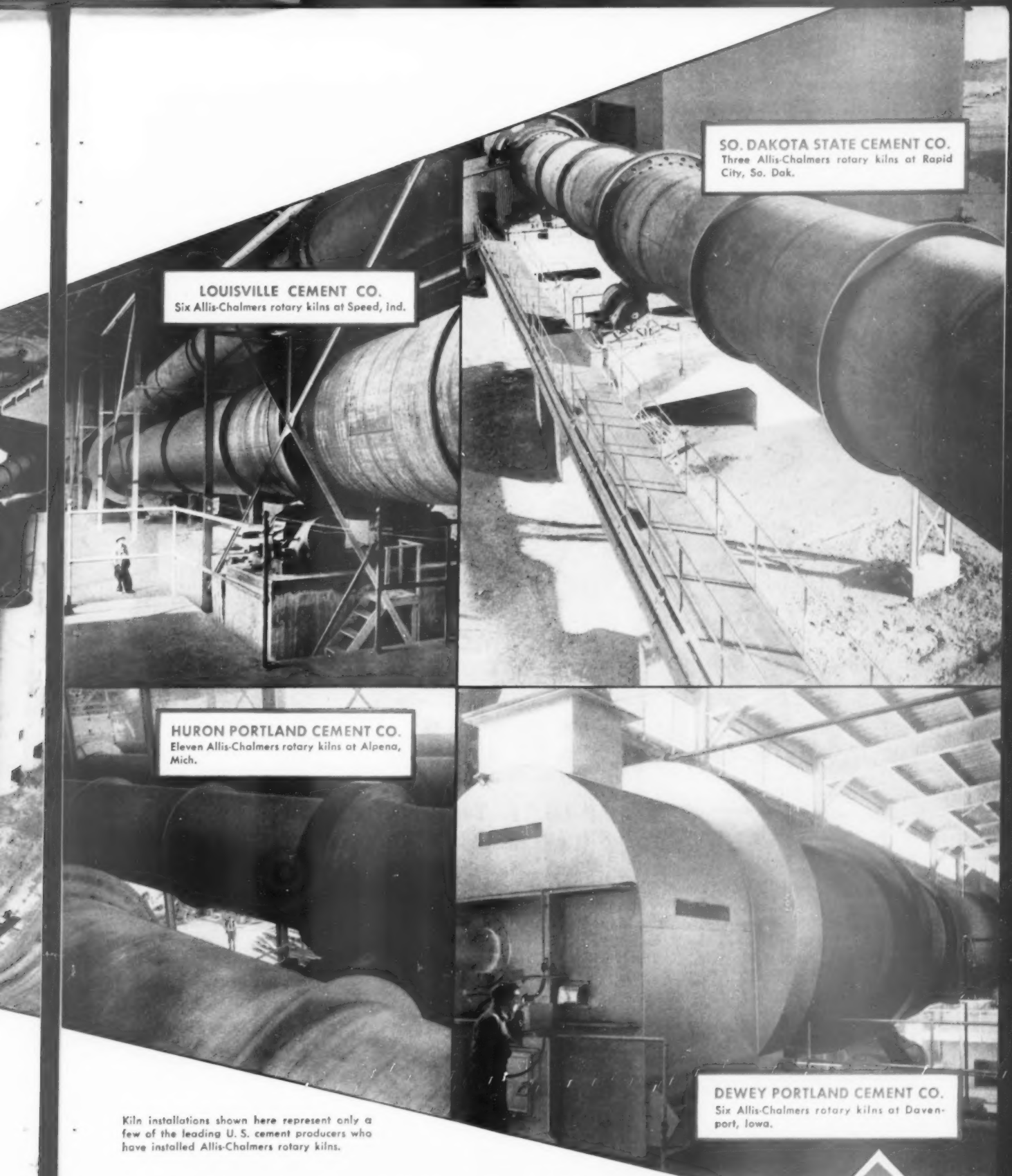
CEMENT OPERATORS have long recognized the splendid performance records of Allis-Chalmers rotary kilns — performance that is the result of Allis-Chalmers specialized engineering and years of experience in building *hundreds* of kilns.

Low production and maintenance costs...dependable performance year after year — these are solid, dollar-saving reasons why so many A-C rotary kilns are being installed in the cement industry today. A-3753



MARQUETTE CEMENT MFG. CO.
New 12 x 475-ft Allis-Chalmers rotary kiln at Brandon, Miss.

LONE STAR CEMENT CO.
Two 10 x 340-ft Allis-Chalmers rotary kilns at Sweetwater, Tex. Two Allis-Chalmers rotary kilns of same size at Roanoke, Va.



LOUISVILLE CEMENT CO.
Six Allis-Chalmers rotary kilns at Speed, Ind.

SO. DAKOTA STATE CEMENT CO.
Three Allis-Chalmers rotary kilns at Rapid City, So. Dak.

HURON PORTLAND CEMENT CO.
Eleven Allis-Chalmers rotary kilns at Alpena, Mich.

DEWEY PORTLAND CEMENT CO.
Six Allis-Chalmers rotary kilns at Davenport, Iowa.

Kiln installations shown here represent only a few of the leading U. S. cement producers who have installed Allis-Chalmers rotary kilns.

Important facts about *profitable* kiln operation can be obtained from the A-C representative in your area. Call him, or write Allis-Chalmers, Milwaukee 1, Wisconsin, for Rotary Kiln Bulletin 07B6368A.

A-C ALLIS-CHALMERS

ALLIS-CHALMERS

Those jagged, heavy rocks can heap a lot of abuse on equipment, but TRAXCAVATOR Shovels are built to take it and keep coming back for more. Raid Brothers quarry uses the HT4 to clean the pit floor, handle and load material.

$9,451

SAVING IN '51

PROOF THAT IT PAYS TO OWN "CATERPILLAR"-TRACKSON EQUIPMENT!

The Raid Brothers Construction Co. opened their quarry near Augusta, Iowa, in 1946 with a variety of equipment. High cost of operation led them to look deeply into equipment performance . . . and led them to standardize on "Caterpillar"-built Equipment and TRAXCAVATOR Shovels. Fuel costs in 1949, with partial conversion, ran to 12.64 cents per ton.

By 1951, all but one or two units at the quarry were "Caterpillar"— Engines powering shovels, crushing plants, conveyors . . . Tractors with 'Dozers, TRAXCAVATOR Shovels. *And by 1951, fuel costs were down to 5.37 cents for each of the 130,000 tons produced—a total saving in fuel costs alone of $9,451 for the one year!*

Melvin Raid, co-owner of the company, says, "We're now a 100% 'Caterpillar' plant. Our figures prove the sound economy of our choice. Even with the hard work and abuse the quarry gives the equipment, we rely on 'Cat' Equipment to perform at consistent efficiency, day after day!"

You, too, can have savings like these . . . call your "Caterpillar" Dealer and let him tell you how little it costs to standardize on the big yellow machines.

CATERPILLAR TRACTOR CO., Peoria, Illinois

TRACKSON

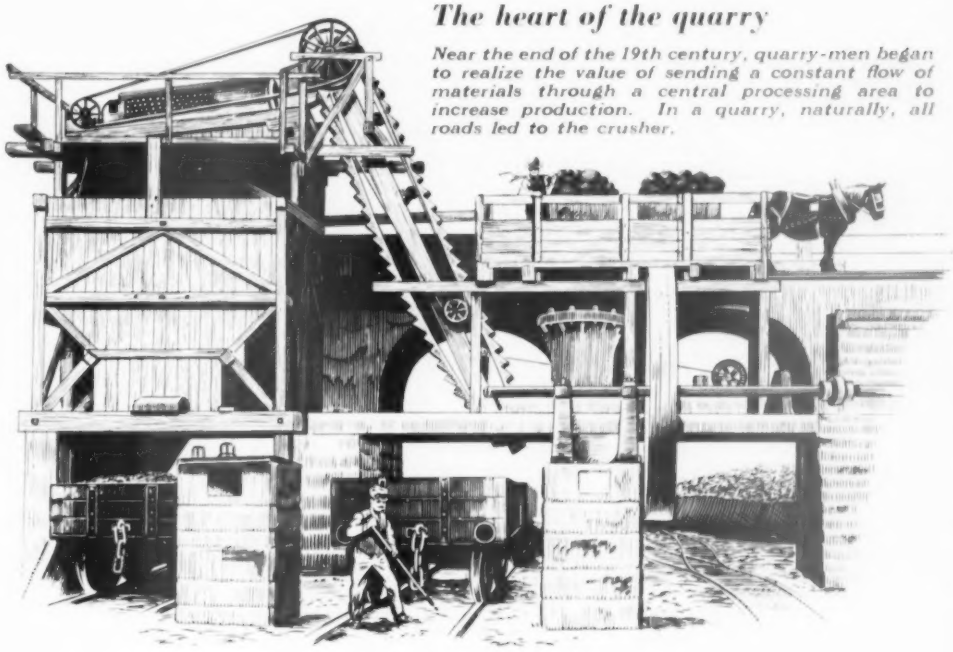
REG. U. S. PAT. OFF.

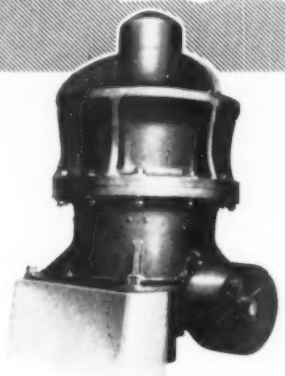
A SUBSIDIARY OF CATERPILLAR

TRAXCAVATOR® SHOVELS
PIPE LAYERS
ANGLEFILLERS

The heart of the quarry

Near the end of the 19th century, quarry-men began to realize the value of sending a constant flow of materials through a central processing area to increase production. In a quarry, naturally, all roads led to the crusher.





The Traylor TY Reduction Crusher features modern, compact design for maximum production with minimum maintenance. Ask for Bulletin 6112 for specifications and description.

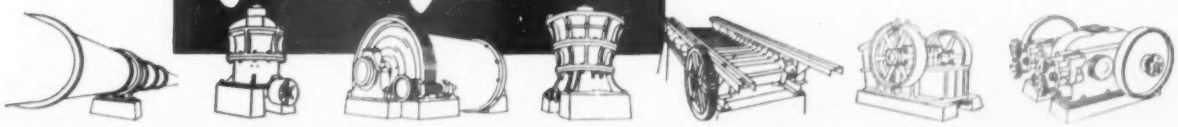
For 50 years, Traylor has worked closely with the men who look for ways to increase their production. As ideas and methods changed, Traylor developed better, more efficient machinery to meet these new standards of production. It is this experience, gained by working closely with customers for half a century that makes an order for Traylor equipment a wise order today.

TRAYLOR ENGINEERING & MANUFACTURING CO.
1455 MILL ST., ALLENTOWN, PA.

SALES OFFICES: New York • Chicago • San Francisco
Canadian Mfrs: Canadian Vickers, Ltd., Montreal, P. Q.

OUR GOLDEN ANNIVERSARY YEAR
1902 1952

a **Traylor** *leads to greater profits*



7 out of every 10

are repeat orders

ALLIS-CHALMERS
GRINDING MILLS

OPERATING MEN who have had actual experience with Allis-Chalmers grinding mills will usually specify A-C mills again . . . as proved by our sales records.

Repeat orders, of course, come only from customers who have been well satisfied. That's why we're proud of the fact that 7 out of 10 new Allis-Chalmers grinding mills go to operators for whom we have supplied mills in the past.

Ask the Allis-Chalmers representative in your area about the many high output and low maintenance advantages of Allis-Chalmers grinding mills. Or write for Grinding Mill Bulletin 07B6718A. Allis-Chalmers, Milwaukee 1, Wisconsin. A-3845

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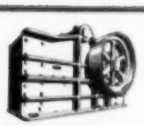
A-C ALLIS-CHALMERS

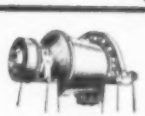
Sales Offices in Principal Cities in the U. S. A. Distributors Throughout the World.

Hammermills

Vibrating Screens

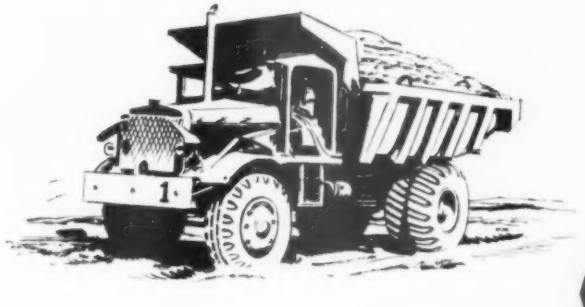

Jaw Crushers

Gyratory Crushers


Grinding Mills

Kilns, Coolers, Dryers

MUSCLE MAN
for tire-killing jobs



THIS burly giant pulls through rough going that other tires find hard to take. Massive lug-bars armor its underbody and sidewalls—shrug off stones, stumps, snags and potholes. Extra thick, self-cleaning treads shield its extra thick plies—give you better traction, *full pull*, forward or reverse. A sturdy standby is this super-tough Goodyear—the Hard Rock Lug. Wherever the going is really rugged, it can save you time and money—perhaps the job itself!

HARD ROCK LUG
Super-tough champ in all types of tire-killing work.

HARD ROCK RIB
Companion tire for front wheels in all tire-killing service. Easier steering, smooth rolling, same cord body, same shoulder and sidewall as the Hard Rock Lug.

ROAD LUG
This high-stamina, dual-purpose tire is best for trucks that operate both OFF and ON the road. Tough construction and special tread design provide super-traction off the road—long, smooth mileage on the road.

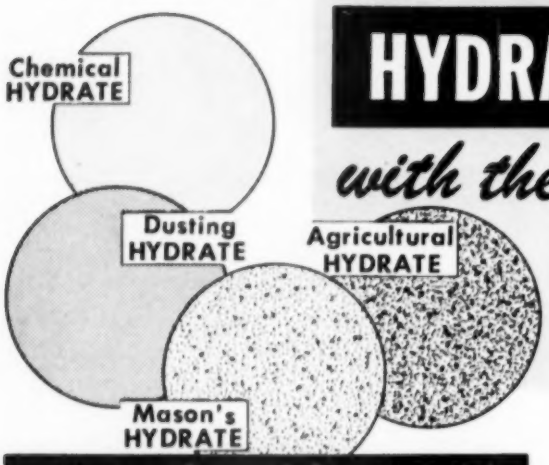
FOR EVERY JOB, THERE'S A COST-CUTTING GOODYEAR TIRE!

Road Lug—T. M. The Goodyear Tire & Rubber Company, Akron, Ohio

GOODYEAR

MORE TONS ARE HAULED ON GOODYEAR TRUCK TIRES THAN ON ANY OTHER KIND

Produce UNIFORM Grades of HYDRATED LIME *with the Raymond* AUTOMATIC PULVERIZER



ALL Grades with ONE Unit

THE Raymond Automatic Pulverizer offers special advantages in the production of superior quality lime at a record low cost per ton:

One unit of equipment handles the complete operation of disintegrating, classifying and conveying the hydrated lime, as well as rejecting impurities from the finished product.

All grades can be made with this machine, ranging from super-fine chemical and spray limes to mason's and agricultural hydrate.

Whizzer air separation gives easy control of the fineness from about 95% passing 100 mesh to 99.9% through 400 mesh.

It is an automatic dust-free system that assures consistently uniform hydrate with utmost economy of production, especially in the finer grades.

Automatic Pulverizers are available in a number of different sizes to meet various capacity requirements.

If you are making any kind of lime products, you can get dependable results from the Raymond Automatic Pulverizer . . . the widely accepted *standard equipment* throughout the industry.

Raymond Automatic Pulverizer equipped with Whizzer Separator

SINCE 1887

Write for CATALOG No. 60

COMBUSTION ENGINEERING – SUPERHEATER, INC.

1307 NORTH BRANCH ST., CHICAGO 22, ILLINOIS

Raymond PULVERIZER DIVISION

SALES OFFICES IN PRINCIPAL CITIES

Look at the production

27¢

buys

One hundred and seven times each hour, this busy, hustling Lorain Shovel turns and disgorges one ton of limestone into trucks. Coolly and efficiently the "Caterpillar" D318 Diesel Engine that powers this shovel works in limestone dust, rain and heat, until at the end of an 8-hour day 850 tons of limestone have been loaded.

That's powerful production, but what does it cost? To get *more than 100 tons* of limestone an hour, the Diesel uses only *27 cents' worth of fuel*. That's because "Cat" Engines use low-cost, non-premium fuel—without fouling. No wonder then that the owners, Columbia Rock Products Corp., Columbia, Tenn., say:

" 'Caterpillar' equipment is tops for quarry work, excavating and grading, and mining phosphate. Our old gas-engine-powered shovel used 50 gallons of gasoline a day against 16 gallons of fuel oil used by the 'Caterpillar' D318 Engine."

The "Cat"-powered shovel works in a one-acre quarry, 50 feet deep. It operates on four different levels. Rock is shot every other day.

Besides the D318, Columbia Rock owns this other "Caterpillar" equipment: another "Cat" Diesel to power a second Lorain Shovel; a D6 Tractor, and a motor grader.

Hard-working, economical "Caterpillar" Engines, up to 500 horsepower, are available in machines made by leading equipment manufacturers. Let your "Caterpillar" Dealer show you engines that will lower your costs and boost your production and profit.

CATERPILLAR, PEORIA, ILLINOIS

CATERPILLAR

REG. U. S. PAT. OFF.

DIESEL ENGINES
TRACTORS • MOTOR GRADERS
EARTHMOVING EQUIPMENT

AGAIN... KENNEDY PRESENTS AN INNOVATION IN CRUSHING EQUIPMENT!

NEW

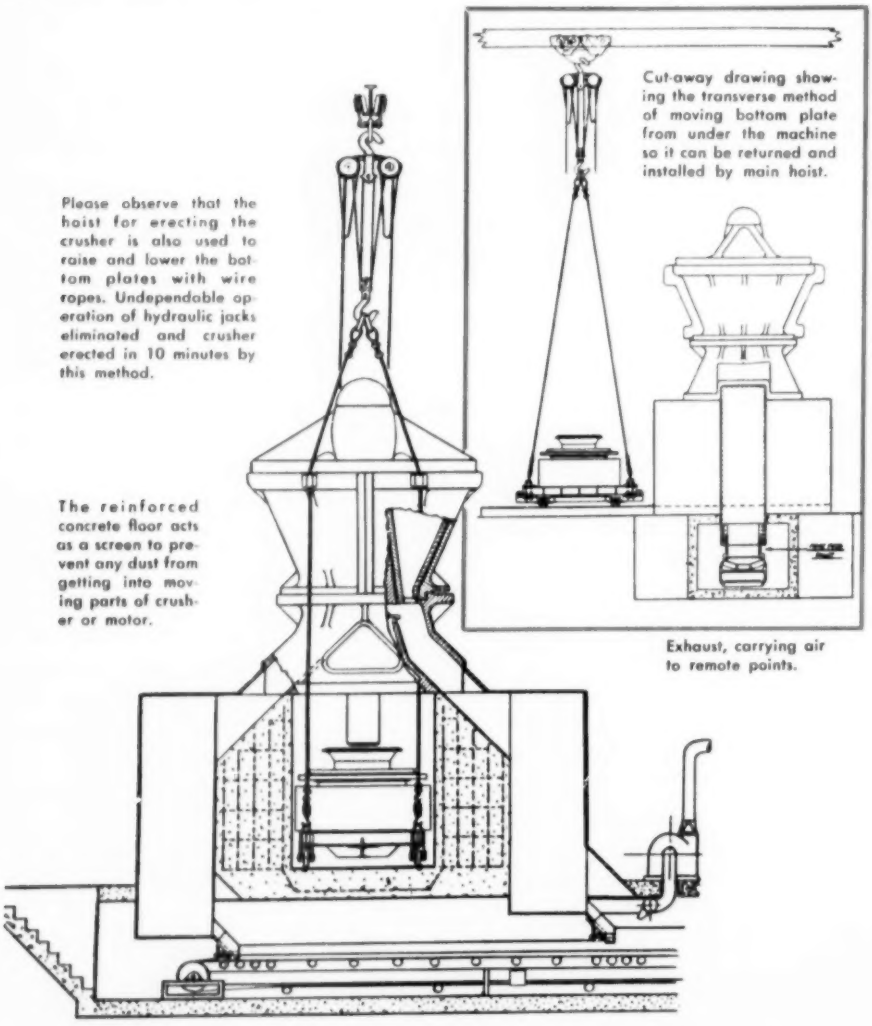
Gyratory Crusher with dual discharge outlets increases output and efficiency!

Only KENNEDY has the correct answer to the "Sticky Ore" problem! KENNEDY Gearless Gyratory Crushers are now built with TWO DISCHARGE OUTLETS plus an exclusive "No-Stick" feature that doubles efficiency and output. This distinct innovation in crusher design is another "FIRST" for the world-famous line of KENNEDY crushing equipment.

Hard-to-crush rock and ore such as limestone, trap rock, basalt, taconite, slag, etc., *containing as high as 50% clay*, can be handled without sticking or clogging by the exclusive KVS process.

No other crusher offers this advantage. Double discharge outlets, built at a discharge angle of 70°, assures uninterrupted delivery of material. Other crushers, with single 42° outlets, operate more slowly because the discharge outlet becomes clogged with sticky clay or taconite ore.

In the new KVS crushers, rock and ore pass through mantle and concaves at bottom. A vertical drop of 6 feet then quickly and surely disgorges sticky clay, etc.—greatly speeds production by eliminating clogging—saves countless man hours clearing stalled crushers.



Please observe that the hoist for erecting the crusher is also used to raise and lower the bottom plates with wire ropes. Undependable operation of hydraulic jacks eliminated and crusher erected in 10 minutes by this method.

The reinforced concrete floor acts as a screen to prevent any dust from getting into moving parts of crusher or motor.

Cut-away drawing showing the transverse method of moving bottom plate from under the machine so it can be returned and installed by main hoist.

Exhaust, carrying air to remote points.

CHECK THESE FEATURES!

Synchronous motor built into pulley assembly

Smooth frictionless operation because the crusher is gearless

Power used ONLY for crushing

All moving parts carried on self-aligning roller bearings

KVS forced-feed oiling system pumps four barrels of oil per hour through bearings without waste

Eccentric and ball are spray babbited. NONE has been rebabbited in over three years

Send for bulletins describing all types of KVS crushers. Let us prove that "It Costs Less To Own The Best".

Machinery and Equipment . . .

in use the world over!

Experience gained in almost a half-century of designing, engineering and manufacturing machinery, used in leading plants the world over, is reflected in the dependability and economy of operation which distinguishes all KVS products. Flow charts and maintenance records compiled in the operation of many different plants equipped with KVS machinery and equipment show an unvarying *decrease* in production costs and a uniform *increase* in output.

The KVS plant at Danville, Pa., provides unrivalled manufacturing facilities. Over 20 acres of floor space under the cranes, equipped with the most modern machinery and engineering facilities in the world, is devoted exclusively to the manufacture of crushing and mining equipment for Lime and Cement plants plus steam generating plants designed to provide maximum power for processing a wide variety of materials and products.

Gyratory Crushers
(Double Discharge Outlets)
Primary and Secondary

Swing Jaw Crushers
(Jaws reversible, end-to-end)

Slugger Rolls
(Available in single roll models)

Stratified Air Swept Tube Mills

Preheaters, Soaking pits, Deheaters

Rotary kilns, Coolers, Dryers
(sectional lengths and diameters)

Rod, Ball and Tube Mills

Vibrating Screens
(One, Two or Three decks)

Heavy-Duty Rock Feeders
(Kennedy Overlapping Pans)

Disc and Twin Screw Feeders

Apron Feeders and Conveyors

Heavy-Duty and Exhaust Fans

Cyclone Collectors

Turbines—Boilers

Waste Heat Boiler Installations

Pneumatic Transport Pumps

Air Activated Containers
For transporting cement and other pulverized materials by rail, motor truck or within the plant. Send for special bulletin.

KENNEDY-VAN SAUN MFG. & ENG. CORPORATION manufactures everything from a crusher to complete Lime, Cement and Mining Plants and Steam Generating Equipment.

Send for bulletins describing all KVS machinery and equipment. Let us prove "It Costs Less To Own The Best"

IT COSTS LESS.. TO OWN THE BEST!

KENNEDY-VAN SAUN
MANUFACTURING & ENGINEERING CORPORATION
TWO PARK AVENUE, NEW YORK
***FACTORY* DANVILLE, PA.**

PROBLEM: How to cut delivery costs, eliminate long hauls, damage to sewer pipe

C Tournacrane . . . 186 h.p. diesel . . . 5 speeds to 35 m.p.h. . . . 21.00 x 25 low pressure tires . . . power steer. 90° turns . . . electric controls. Uses 4-wheel multi-disc air brakes, total surface 3763 sq. in.

Queen City Concrete Pipe Corp., Cincinnati, finds low-cost way of hauling BIG pipe

When you bring together a good machine with a new cost-cutting method of doing a job, you've got a real money making combination. That's how rubber-tired Tournacrane paid off for Queen City Concrete Pipe Corp. of Cincinnati, Ohio, manufacturers of concrete sewer pipe.

The common practice of manufacturing the large diameter pipe at one location, then shipping it, in many cases on long overland trips to point of use, is often an expensive proposition. This is true especially when sizes and shapes of pipes limit the most efficient use of flat-car space . . . and further, allowance must be made for the ever present danger of pipe breakage or damage enroute to destination.

The Queen City firm licked this problem by co-ordinating Tournacrane with their unique pipe construction method shown. They were able to bid lower and received sub-contract to construct all sewer pipe on a $4,813,000, 6-mile trunk sewer addition to the Evansville (Ind.) sewage disposal system. Ryan Constr. Co., Evansville, was the prime contractor.

Picture story shows how versatile, rubber-tired Tournacrane, equipped with a short jib-boom crane, handled the entire operation of lifting and moving pipe (12.8 tons each) to location 1.1 miles away, fast, economically and safely. Moving, lifting and reaching was all controlled by one man who operates all machine movements simultaneously or independently from convenient dashboard electric switches.

In addition to its ability to lift and carry capacity loads anywhere, Tournacrane's exclusive 3-way crane action lets you lift, spot and place loads horizontally on a *low* boom . . . you can reach through windows, doorways, into boxcars, through hatches and other low clearance obstructions.

Self-powered, moves anywhere

Further, Tournacrane's exceptional mobility on low-pressure tires, lets you make self-powered moves on the job or job-to-job over any surfaces: pavement or dirt roads . . . through traffic . . . under low wires . . . across curbs or rails . . . down tracks and over trestles . . . through mud, sand, snow, etc. This means you travel at 30 m.p.h., go anywhere without usual equipment loading or roading delays and costs.

Tournacranes are available in two sizes: 15-ton model "C" (also with standard boom lifting and reaching to 35′) and the 7-ton model "D" (lifting 29′3″, reaching 31′). If you're passing up jobs involving unusual and difficult lifts which your present equipment won't handle, be sure to see your LeTourneau Distributor for complete facts on these money-making tools.

SOLUTION: Faster, safer handling with LeTourneau rubber-tired crane

1 Forms are prepared, fabricated steel reinforcing set in place and concrete poured . . . after curing and finishing is completed, highly maneuverable Tournacrane is easily backed up to sewer pipe. Here, Tournacrane operator tightens belly-band to prepare for lifting the 12.8 ton cast pipe. These 120" I.D. pipes are 6' long, have 10" walls, contain 2016 lbs. of reinforcing steel. Any unskilled person may learn to operate unit in a few minutes time.

2 Using cross-bar hitch, Tournacrane carefully lifts pipe away from casting site. Sliding boom on tilted track gives you unique load maneuverability. Individual electric motors control each lifting function independently by merely depressing simple electric dashboard switches. Action is instantaneous . . . no complicated levers to fight! Powerful motors brake automatically, safely, when switch is released or power cut off.

3 Pipe load starts on its way to installation site. Note rugged box-beam construction of A-frame and boom structure that stands up under extreme loads without sway or vibration. Big 21.00 x 25 low-pressure tires provide excellent, even load deflection . . . cushioning bumps on the travel route. Machine can lift and move over irregular terrain, lift safely on soft or muddy footing . . . let you keep going in any kind of weather.

4 Tournacrane carried load up to 1.1 miles from manufacturing site to place of installation. Big rig moved with load through traffic in a residential area, over surfaced and dirt roads at speeds of 10 to 15 m.p.h. When making job-to-job moves, operator can drive at speeds up to 35 m.p.h. Four-wheel air brakes with a total of 3763 sq. in. braking surface give operator confidence to use top speeds whenever possible.

5 At installation site, Tournacrane easily maneuvers big load, spotting it with ease in spite of tight quarters. Tournacranes turn in less than their own length. Operators can make 90° left or right turns by merely depressing finger-tip switches. Stability at any angle plus ability to turn sharply, together with the unique advantage of reaching out with boom under low clearance structures, are important advantages for owners

6 Sewer pipe is finally placed on roadside where it cures an additional 7 days. Here, operator removes belly-band. Returning to original site, Tournacrane repeats its one-man work cycle. Electric control greatly simplifies operation and cuts down training time necessary to make competent operators. Prime mover interchanges on: 18-ton scraper, 16-ton rear-dump hauler, 16-ton bottom dump hauler, 20-ton flatbed hauler.

R.G. LeTourneau, Inc.

Peoria, Illinois

Mail today **to R. G. LeTOURNEAU, Inc., Peoria, Illinois**

Gentlemen: Please send information on Tournacrane.

Name _____ Title _____

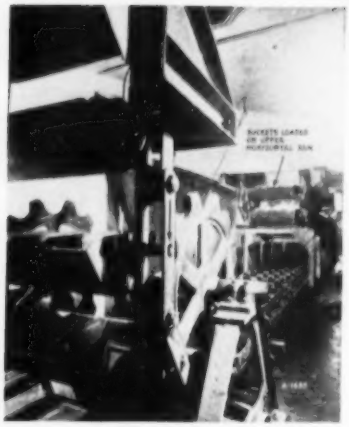
Company _____

Address _____

City _____ State _____

For maximum lifts of _____ tons. Type of loads _____

S-A Pivoted Bucket Conveyors move 2400 tons of coal each day from rail cars to storage and feeder bins. After kilning, the refractory "clinker" is carried by other S-A Pivoted Bucket Conveyors to various areas for shipment or further processing.



S-A Pivoted Bucket Conveyor with four compartment buckets for handling four different materials simultaneously.

S-A CONVEYING Systems

are again chosen for a **BIG JOB** at **BASIC REFRACTORIES'** new plant . . .

The huge new Maple Grove plant of Basic Refractories, Incorporated, will expand the company's output by at least 300,000 tons a year. The rotary kilns installed to produce granular dolomitic refractories for steel makers and other producers are the largest in the world.

Stephens-Adamson Pivoted Bucket Conveyors are major components of Basic's efficient handling set-up. They were chosen for two main reasons:

Past performance by S-A units which have been operating since 1925 at Maple Grove with low maintenance and minimum down time.

Efficient design that provides complete flop-over of buckets. This allows refractory "clinker" to drop free, increases carrying capacity and eliminates product loss.

The same kind of experience that helped Basic solve its handling problems is at *your* service. If you have a bulk handling need, why not call in an S-A engineer? Write and we'll arrange a meeting.

- Belt Conveyors
- REDLER Conveyor-Elevators
- ZIPPER Conveyor-Elevators
- Weigh Larries
- Crushers, Roll and Ring Type
- Bucket Elevators
- Pivoted Bucket Carriers
- Screw Conveyors
- Skip Hoists
- Belt, Pan & Plate Feeders
- Track Hoppers & Bin Gates
- TELLEVEL Bin Level Controls
- Water Intake Screens
- SEALMASTER Ball Bearing Units

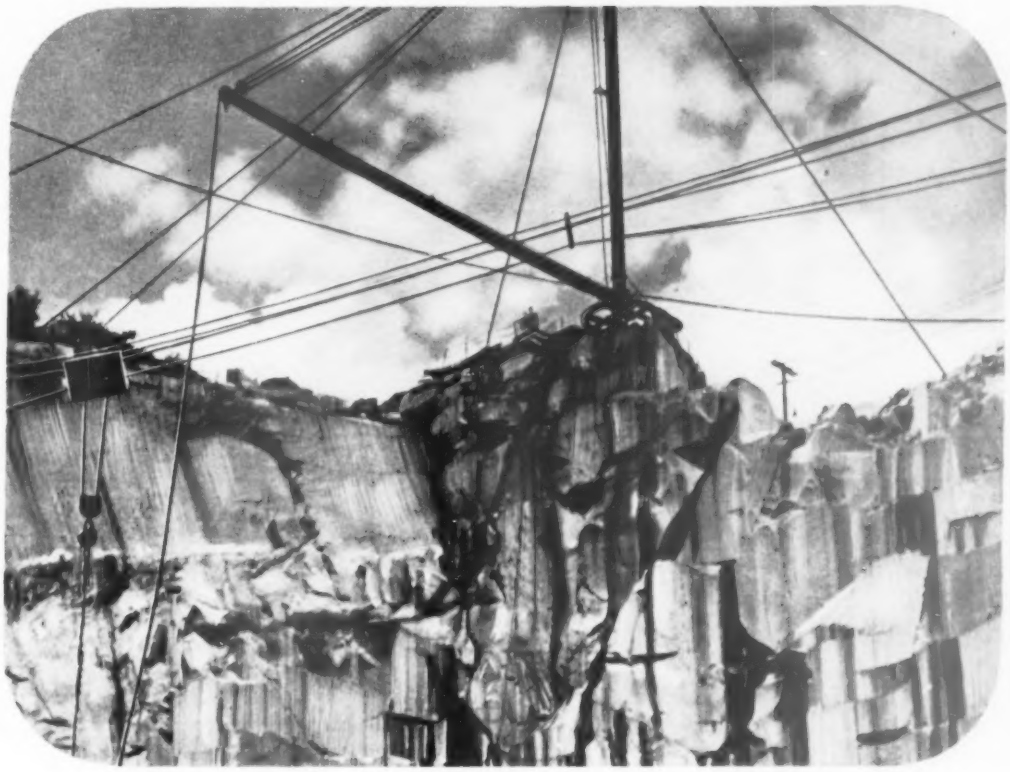
• *Write for a bulletin on any of the above.*

STEPHEN S-A DAMSON MFG. CO.

7 Ridgeway Avenue, Aurora, Illinois — Los Angeles, Calif., Belleville, Ontario

DESIGNERS AND MANUFACTURERS OF ALL TYPES OF BULK MATERIALS HANDLING EQUIPMENT

WIRE ROPE



This is the most efficient rope we've ever made for quarry service

JUST MENTION wire rope and most everyone thinks of Roebling. For one thing, Roebling made the first wire rope in America. But what counts more, we've always set the pace in developing better wire and better rope for the needs of every branch of industry.

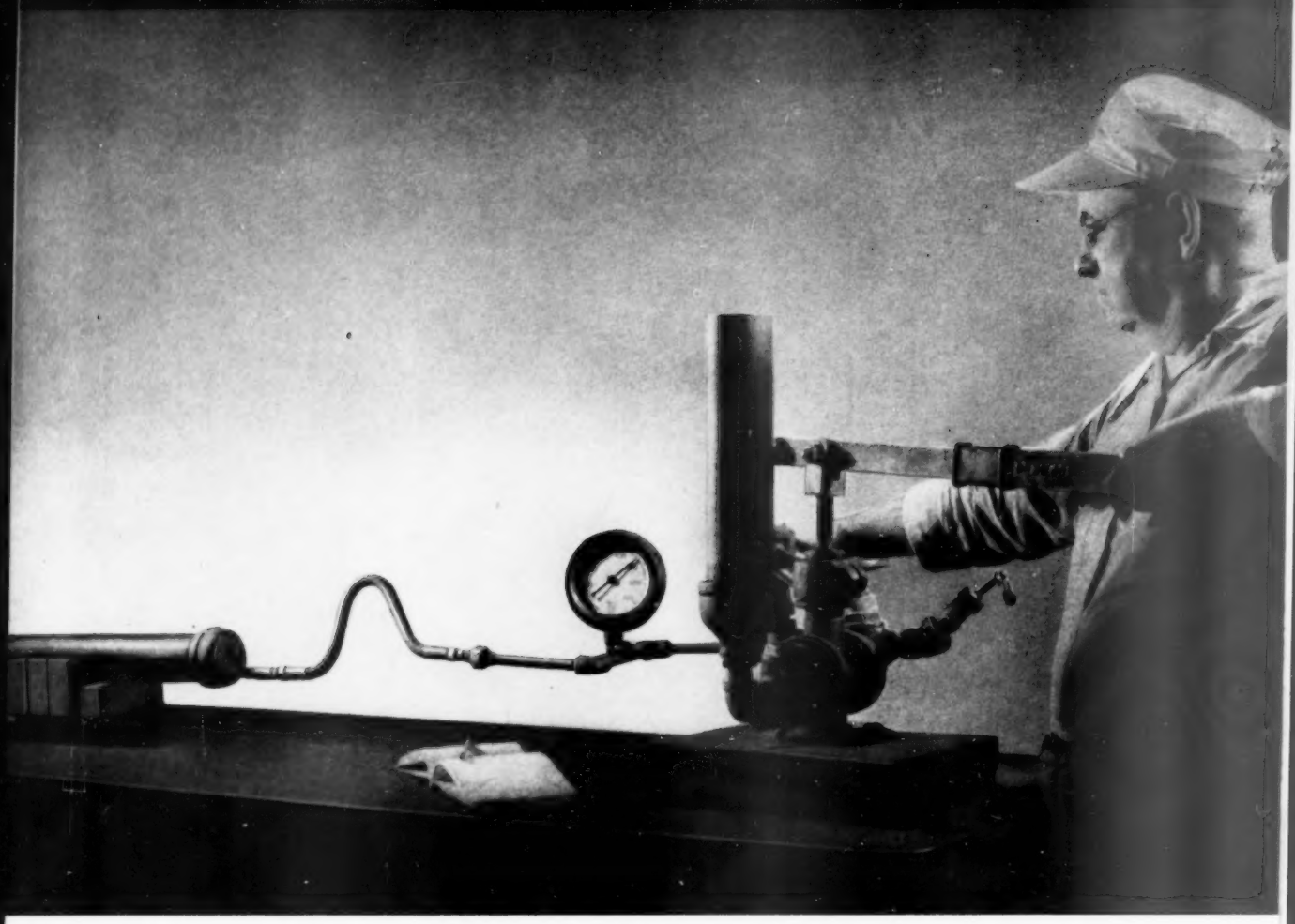
Today's Roebling Preformed "Blue Center" Steel Wire Rope is the quarry men's best bet for all-around efficiency and long life. It helps you get continuous production and stands up under rough going. It saves you time and cuts costs.

There's a Roebling wire rope of the right specification for top service on any job. Call on your Roebling Field Man for his recommendations. John A. Roebling's Sons Company, Trenton 2, New Jersey.

ROEBLING

ATLANTA, 934 AVON AVE. • BOSTON, 51 SLEEPER ST. • CHICAGO, 5525 W. ROOSEVELT RD. • CINCINNATI, 2253 FREDONIA AVE. • CLEVELAND, 13225 LAKEWOOD HEIGHTS BLVD. • DENVER, 4901 JACKSON ST. • DETROIT, 815 FISHER BLDG. • HOUSTON, 6216 NAVIGATION BLVD. • LOS ANGELES, 5355 E. HARBOR ST. • NEW YORK, 19 RECTOR ST. • ODESSA, TEXAS, 1920 E. 2ND ST. • PHILADELPHIA, 230 VINE ST. • SAN FRANCISCO, 1740 17TH ST. • SEATTLE, 900 1ST AVE. S. • TULSA, 321 N. CHEYENNE ST. • EXPORT SALES OFFICE, TRENTON 2, N. J.

PROGRESS IN EXPLOSIVES . . .



FOR WORKING UNDER PRESSURE

Hercules' research has developed explosives that shoot successfully even under the severe water pressures encountered today in seismograph prospecting.

In the laboratory test shown here, a cartridge of Hercules Vibrogel® 3 is sealed in the steel "bomb" at the extreme left. It then undergoes prolonged exposure to pressures greater than those ordinarily found in actual field use. Because Vibrogel 3 embodies a new conception of explosives research, it detonates despite these extreme conditions.

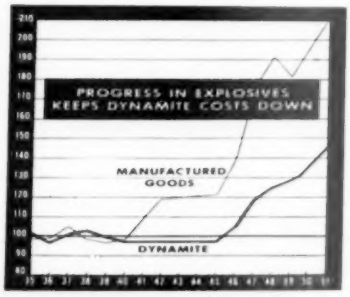


Chart shows relative stability of dynamite prices since 1935, as compared with prices of other manufactured goods. 1935-39 values = 100.

HERCULES POWDER COMPANY

INCORPORATED

Explosives Department, 946 King St., Wilmington 99, Del.

West Virginian doubles footage for less than half equipment cost!

Uses TRACTAIR with Mobildrill

Self-propelled, self-contained wagon drill and air compressor

LE ROI

As much as 750 feet of hole daily, where only 300 feet were drilled before! More than double the production of three hand-held sinkers and a 315-cfm compressor! Substantial savings on both fuel and equipment costs! That's the remarkable record a Le Roi Tractair with Mobildrill set for one user in West Virginia.

Tractair with Mobildrill is a light-weight Le Roi-CLEVELAND wagon-drill unit mounted on Tractair — a combination 35-hp tractor and 105-cfm compressor.

One man can drive the Tractair with Mobildrill — and go places he couldn't get to if he had to tow separate compressor and wagon drill. He can sink vertical or drill horizontal holes at any angle up to 12' high. Swinging boom permits him to drill 4-6 holes of a pattern from one spot.

See for yourself how a Tractair with Mobildrill meets your requirements for fast, flexible drilling. Make arrangements with your nearby Le Roi distributor to watch a Tractair with Mobildrill at work. Also investigate the complete line of Le Roi-CLEVELAND rock drills — hand-held machines from 19 to 80 lbs., light and heavy wagon drills, the exclusive T-286 Dual Drill Rig, and a complete line of portable air compressors.

LE ROI COMPANY

MILWAUKEE 14, WISCONSIN
Plants: Milwaukee • Cleveland • Greenwich, O

SEND COUPON BELOW FOR FREE BULLETIN

Tear out coupon and mail today!

LE ROI COMPANY, Dept. RP-11
1706 S. 68th Street, Milwaukee 14, Wisconsin

Send me bulletins that describe Tractair with Mobildrill and T-286 Self-Propelled Dual Drill Rig.

Name.....Title.....

Company.....

Company Address.....

City.....(.....) State.....

T-22

NEW Cedarapids Built by IOWA Schrock Motorized HEAD PULLEYS

SIMPLIFY EVERY BELT CONVEYOR AND BELT-BUCKET ELEVATOR INSTALLATION

IT'S COMPLETELY DIFFERENT FROM CONVENTIONAL CONVEYOR DRIVES

Everything is contained **INSIDE** the pulley!

ELIMINATES ALL MAINTENANCE ON SPROCKETS, CHAINS, JACK-SHAFTS, V-BELTS, ETC.

U.S. Pat. No. 3548399 Others Pending

WHAT A *Motorized* HEAD PULLEY IS

THIS is a revolutionary departure from the conventional types of conveyor drives. A *motorized* head pulley is a fabricated steel pulley with *everything*... electric motor, reduction gears and all moving parts . . . contained inside the drum! It's simply a new application of the long-proven gear reduction drive, and because of its simplicity, it's the answer to the maintenance man's prayer. 70% to 90% of conveyor down time is saved by eliminating all countershafts, speed reducers, sprockets, chains, Universal shaft drive and other parts necessary with conventional pulley drives. Motorized Head Pulleys are simple to install and flexible in use, completely interchangeable and adaptable to all types of belt and belt-bucket conveyor installations. By means of a simple adapter, a single pulley can be utilized in any of several belt locations, operating various widths of belt, or changing from larger or smaller horsepower. Pulley sizes range from 5 to 30 HP and are available in various widths. A Motorized Head Pulley is safe, because there are no sprockets, chains, jack-shafts, V-belts, etc. to endanger personnel. It's compact... requires no more room than a conventional pulley. Complete protection from weather, grit and dirt also reduces maintenance. Cedarapids Schrock Motorized Head Pulleys have been job-tested for many years under severest working conditions.

HOW IT WORKS

The pulley shell rotates about the electric motor, which is held stationary by means of a torque arm attached to the conveyor frame. The speed of the shell depends upon the combined reduction ratio of the various pinions and gears contained within the pulley shell. This reduction starts with a primary pinion mounted on the motor shaft and ends in the ring gear attached to the shell. The shell in turn then drives the conveyor belt. Leads to the motor enter the head pulley through a hollow conduit passing through the drum end bell and bearing. A simple oil bath gear compartment provides a lubricating bath for the reduction gears and front motor bearing. Motor and head pulley are cooled and ventilated by holes in the drum.

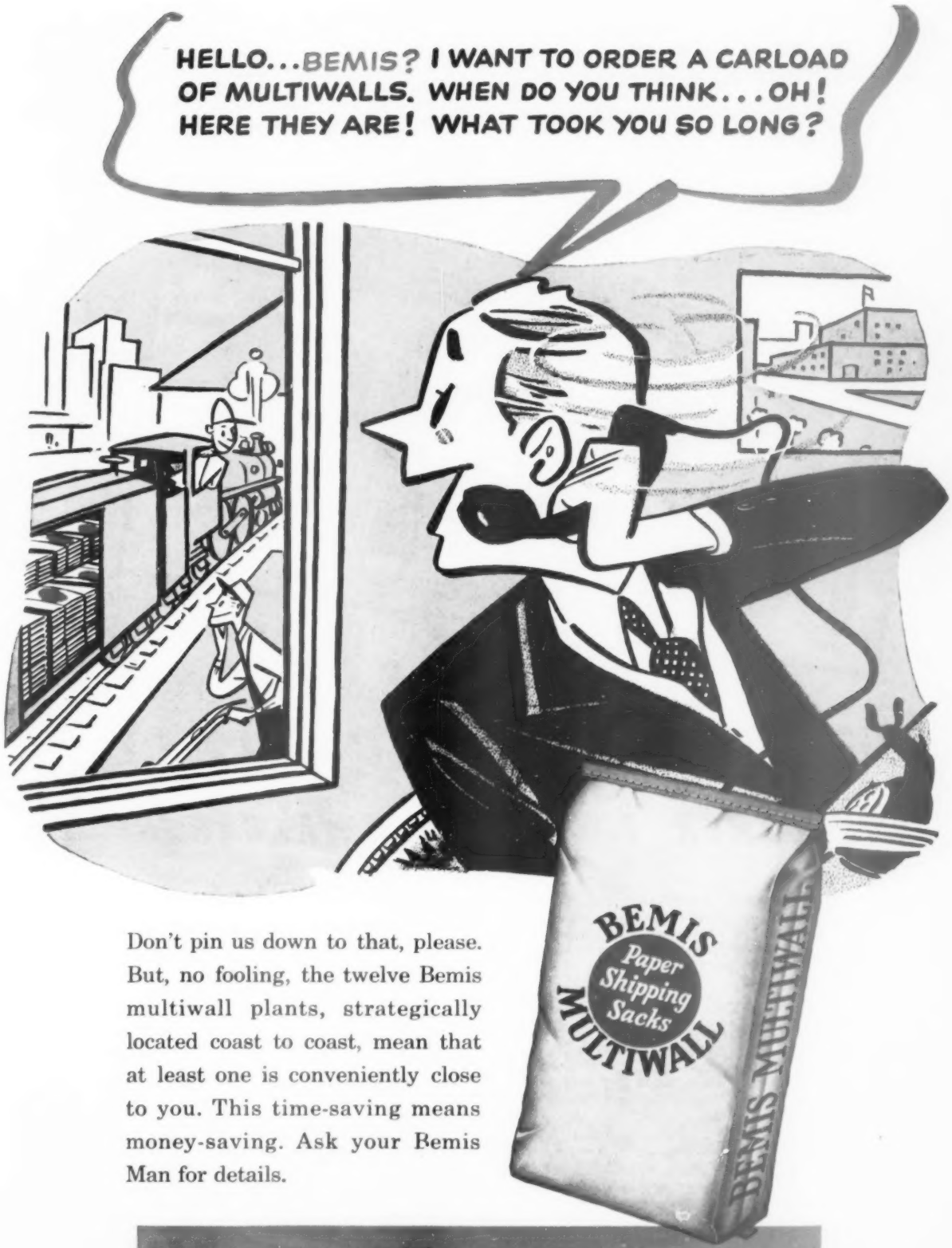
GET COMPLETE DETAILS TODAY

Find out all the advantages of converting your conveyor installations to motorized efficiency before you need head pulley replacements. One internationally known company has 50 Motorized Head Pulleys installed on widespread conveyor operations, and plans more for every installation that requires replacement. Get complete details about every feature. See your distributor today, or write direct to Iowa Manufacturing Company.

IOWA MANUFACTURING CO.
Cedar Rapids, Iowa, U.S.A.

Built for sale in Arizona, California, Idaho, Montana, Nevada, New Mexico, Oregon, Texas, Utah and Washington.

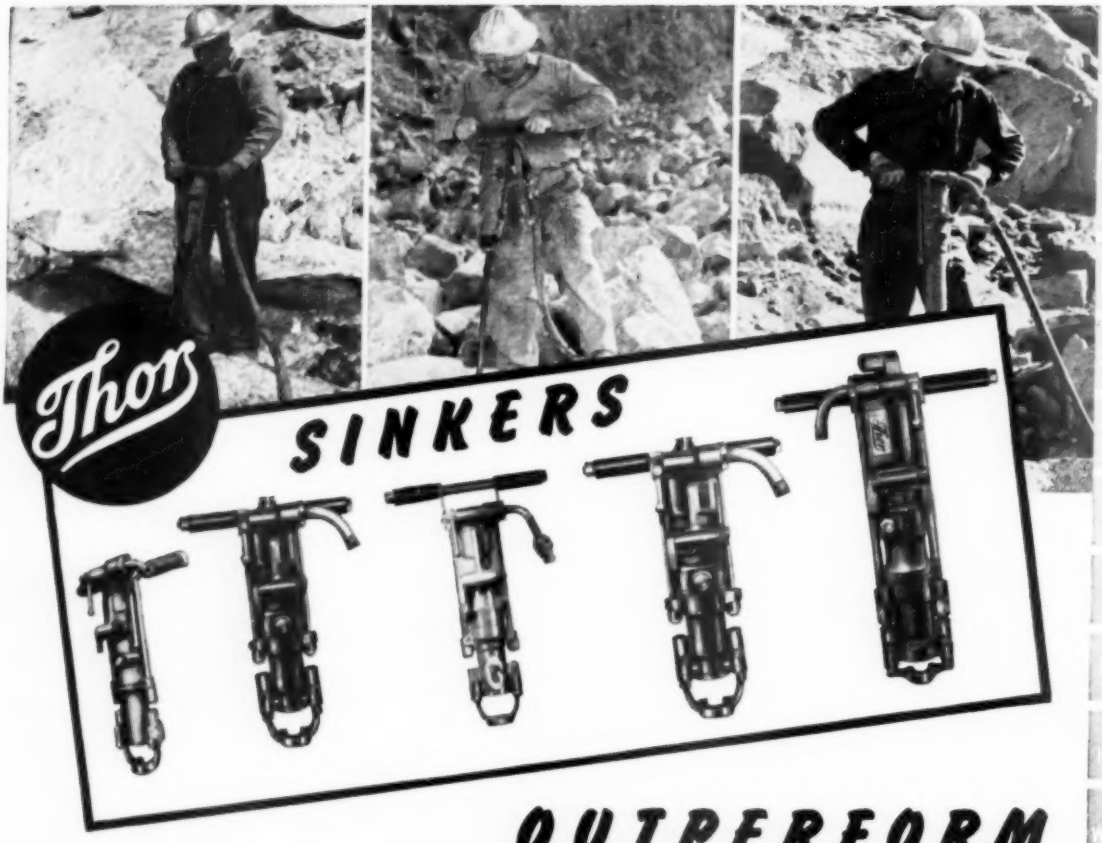
YUBA MANUFACTURING CO.
Pulley & Sprocket Dept., Benicia, California


HELLO...BEMIS? I WANT TO ORDER A CARLOAD OF MULTIWALLS. WHEN DO YOU THINK...OH! HERE THEY ARE! WHAT TOOK YOU SO LONG?
BEMIS
Paper Shipping Sacks
MULTIWALL
BEMIS MULTIWALL

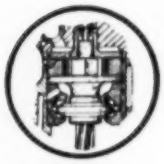
Don't pin us down to that, please. But, no fooling, the twelve Bemis multiwall plants, strategically located coast to coast, mean that at least one is conveniently close to you. This time-saving means money-saving. Ask your Bemis Man for details.

Bemis BEMIS BRO BAG COMPANY

General Offices—St. Louis 2, Mo.
Offices in all Principal Cities



OUTPERFORM AND OUTLAST ANY OTHER TOOLS IN THEIR CLASS!



EXCLUSIVE AUTOMATIC VALVE utilizes ALL the air that enters the machine, measures it for most effective use through machined tolerances of .00025 of an inch. No separate valve parts to lose or wear!

ENDLESS PISTON LIFE—Years of practical field experience show piston breakage practically eliminated in Thor Rock Drills, amazing life for contacting surfaces.

AUTOMATIC LUBRICATION—Built-in lubricator forces oil under pressure through all moving parts with every reciprocation of the piston hammer.

PLUS

"Straight Line" Blowing to clean holes, prevent stuck steels . . . Positive Rotation, with extra-heavy rifle bar, reversible pawls . . . Replaceable Chuck, quick, easy, economical . . . Cushioned Retainer with fully enclosed operating parts.

For years Thor Rock Drills (formerly known as "Cochise" tools) have built an amazing reputation for power, performance and permanence. FIRST IN THE FIELD for shaft sinking . . . block-holing . . . augering . . . exploration . . . a complete selection for every need. Write for Catalog MC-1. Independent Pneumatic Tool Co., Aurora, Ill.

Thor PORTABLE POWER TOOLS

ELECTRIC • PNEUMATIC

HUDSON ENLARGES GUARANTEE ON MULTIWALL SACKS: NOW COVERS DAMAGE ON PACKER

Will replace without cost any Hudson Multiwall Sack broken on packing or closing machines

NEW YORK CITY. The Hudson Pulp & Paper Corp. has announced the terms of an unusual new guarantee to purchasers of Multiwall Sacks. In the first such guarantee in Multiwall Sack history, the company binds itself to replace any Hudson Multiwall Sack which bursts, tears, splits, or otherwise fails in the course of packing or closing. Hudson emphasizes that this new guarantee is in addition to their usual warranties of quality and workmanship implicit in every contract.

A typical scene showing Multiwall Sacks being filled and closed. Now, for the first time, a Multiwall Sack manufacturer is guaranteeing to replace any sacks broken during such operations.

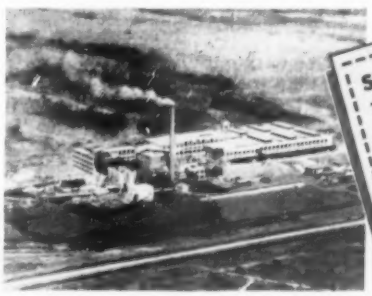
Multiwall Sack Users urged to investigate this offer

The new Hudson guarantee plan went into effect with all sacks purchased on or after Sept. 15, 1952. Multiwall Sack buyers who have learned of this new plan have hailed it as one of the most important developments in years.

Full information regarding the scope and benefits of the guarantee is being sent, without obligation, to all Multiwall Sack buyers who request it.

Integrated Hudson mill assures delivery

Hudson Multiwall Sack contracts are backed up by a fully integrated new mill at Palatka, Florida. Because every step of manufacture is under one control, Hudson is certain all sacks are made to your exact specifications, and are shipped when they are promised!



Though Hudson's Palatka mill is new, Hudson has 42 years of paper making experience.

T. H. Mittendorf (right), Hudson Vice President in Charge of Sales, and J. B. Mendelsohn, Multiwall Sack Sales Manager, look over the first printed copy of the company's unusual guarantee on Multiwall Sacks.

World's most fully guaranteed Multiwall Sack

Hudson has such faith in the quality of its Multiwall Sacks that it gives the world's fullest guarantee on their performance. While other companies warrant their sacks only against abnormal breakage, Hudson guarantees that *all* its sacks must successfully pass *all* filling and closing operations, or be replaced without further cost.

Urge Multiwall Sack users to write for facts

The Hudson Pulp & Paper Corp. invites all users of Multiwall Sacks to learn how they can s... by using guarant... iwall Sacks ... ntee, ...acts ...ys ... ...r ... by ... may be worth

Send for full details:
Tell me, without obligation, about the many advantages of your new Multiwall guarantee.

NAME
COMPANY
STREET
ZONE STATE
CITY

Hudson Pulp & Paper Corp.
Dept. 111, 505 Park Ave., New York 22, N.Y.

complete line of

SINKER DRILLS

for the **QUARRYMAN**

Whatever the type of formation—from soft limestone to hard trap—there is a CP Sinker ideally suited to the work.

Although the lightweight, easy-to-handle CP-22 Sinker weighs only 28 pounds, it has high drilling speed and strong rotation. It is designed for soft to medium formations, and is widely used for secondary drilling.

With its fast drilling, strong rotation and exceptional hole cleaning, the 45-pound general utility CP-32 Sinker easily drills holes twelve to sixteen feet in depth.

The CP-59 is the most powerful drill in this line, and outperforms all other drills in the 55-pound class. Suitable for running deep holes in the hardest rocks encountered in quarry work and for use in broken ground. The all-purpose backhead permits plain dry, blower dry, plain wet or air-water drilling, with minor change-overs.

CP Fiftieth ANNIVERSARY

Write for detailed information.

CHICAGO PNEUMATIC TOOL COMPANY

General Offices: 8 East 44th Street, New York 17, N. Y.

PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES
ROCK DRILLS • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES

the New

OLIVER "OC-18"

the Operator's Dream come true!

Here's a tractor that has been designed specifically to make life as easy as possible for the operator. Just check this list of "easy operating" features —it puts the "OC-18" 'way out in front as the tractor that gets more done . . . faster . . . every day.

1. Over-Center Clutch. The clutch bar runs across the full width of the dashboard. No need here for the operator to hunt for a single lever . . . to take his eyes off the work.

2. Air Steering is *Standard Equipment* You can steer the "OC-18" with just two fingers of one hand.

3. Push Button Electric Starting. The husky starter of the "OC-18" gets the engine going . . . quick.

4. Cold Weather Starting Aid . . . standard equipment on the Oliver "OC-18" for fast, easy starting in extremely low temperatures.

5. Center-Positioned Gear Shift Lever . . . is located right where it's easiest to reach.

6. Ample Leg Room . . . no cramped legs after a hard day's work with the "OC-18".

7. Convenient Foot Parking Brakes are standard equipment on the "OC-18".

8. Comfortable, Two-Man Seat . . . plenty of room for two men in this upholstered seat.

9. Easy-Acting Friction Throttle is located at the right arm rest of the seat in the most convenient position for the operator.

You get plus performance too! A full 126 drawbar horsepower . . . greater stability . . . more track on the ground. Just note the photograph. See how the track hugs the ground almost its entire length. It means real pulling power . . . greater stability and better balance for dozing.

Try out this great new tractor yourself. Ask your Oliver Industrial Distributor to arrange a demonstration. When you've seen the "OC-18", you'll never be satisfied with any other big tractor.

THE OLIVER CORPORATION

400 West Madison Street, Chicago 6, Illinois

A complete line of industrial wheel and crawler tractors

The OLIVER Corporation, Industrial Division
400 W. Madison Street
Chicago 6, Illinois

Gentlemen:

Please send me literature on the Model "OC-18" Industrial Crawler Tractor.

Name .....

Company ..... *Dept.* .....

Address .....

City ..... *State* .....

Moves big payloads faster

—at lower cost

BIG earth-moving vehicles like this twin-engine self-loading scraper get more work done faster because of Allison TORQMATIC DRIVES. These time-proved hydraulic drives — more than 10,000 have been built for Army tanks and heavy-duty vehicles—make multiple engine applications possible —and practical.

TORQMATIC DRIVE provides a smooth, steady, oil-cushioned flow of power—high-starting torque with uninterrupted acceleration —protection against shock-load damage to engines and equipment. It eliminates engine lugging and stalling while maintaining power to drive wheels at all times. This permits the engine to operate in its most effective speed range by balancing engine power with load requirements.

Users of trucks, scrapers and other vehicles equipped with TORQMATIC DRIVE *report up to 30% more work done and 15% less cost per yard than with a mechanical drive* — additional good reasons why engineers are designing Allison TORQMATIC DRIVES into all types of heavy-duty equipment.

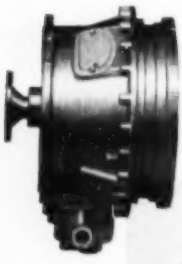
Allison TORQMATIC DRIVES are the only heavy-duty full torque-shifting vehicle transmissions available today — engineered for compactness, permitting flexibility of drive-train design for today's and tomorrow's vehicles.

Like to know more about TORQMATIC DRIVES? Write us for Engineering Data Bulletin which gives full specifications.

ALLISON *Division of* GENERAL MOTORS
Box 894R, Indianapolis 6, Indiana

GM GENERAL MOTORS

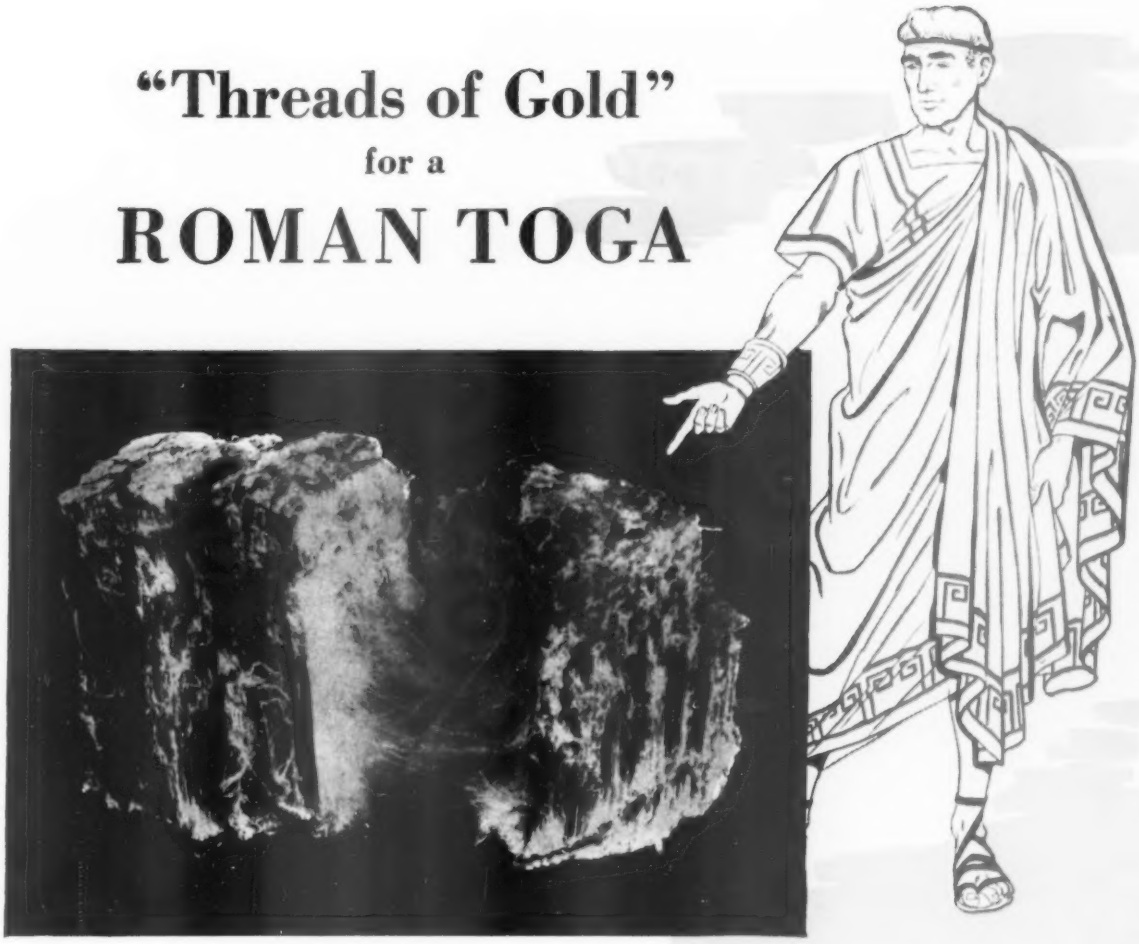
Allison TORQMATIC DRIVES



Compact, efficient hydraulic drive for . . .

CRANES TRACTORS TRUCKS SHOVELS LOCOMOTIVES DRILLING RIGS

"Threads of Gold"
for a
ROMAN TOGA

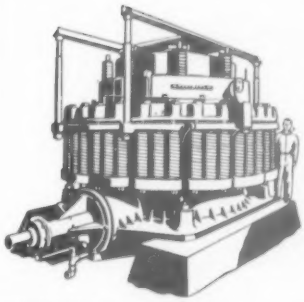


The mineral *Chrysotile,* meaning golden fibers, or threads, supplies over 90% of the world's asbestos requirements. Called the "miracle mineral" by the ancients, the Roman naturalist Pliny (23—79 A.D.) refers to the use of such material as "a rare and costly cloth" used for the funeral garments of kings.

The secret of the great usefulness of asbestos lies in its unique combination of fibrous structure, fire and water resistance, flexibility and strength. Since the profitable recovery of asbestos fiber depends upon fine crushing without destroying fiber length, a crusher that will perform such functions economically, and will produce large quantities of finely crushed material, is essential.

Proof of the world-wide acceptance of *"SYMONS"* Cone Crushers in asbestos production is found in the field, where practically every major producer employs these high capacity, economical machines . . . *as in all of the great ore and industrial mineral operations the world over.*

NORDBERG MFG. CO., Milwaukee, Wisconsin



"SYMONS" Cone Crushers . . . *the machines that revolutionized crushing practice* . . . are built in Standard, Short Head, and Intermediate types, with crushing heads from 22 inches to 7 feet in diameter—in capacities from 6 to 900 tons per hour. C252

"SYMONS" . . . A NORDBERG TRADEMARK KNOWN THROUGHOUT THE WORLD

NORDBERG MACHINERY

NORDBERG

"SYMONS" SCREENS NORDBERG

MACHINERY FOR PROCESSING ORES and INDUSTRIAL MINERALS

NEW YORK • SAN FRANCISCO • DULUTH • WASHINGTON • TORONTO
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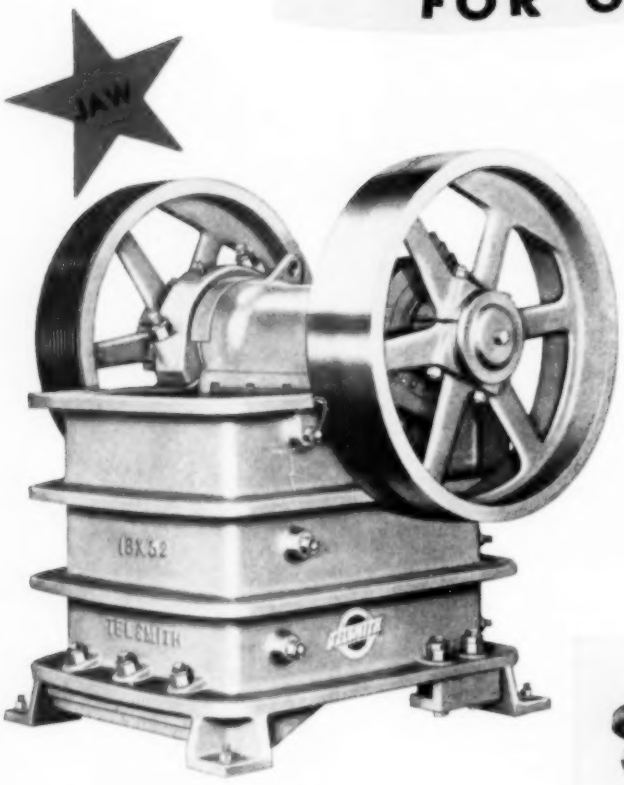
TELSMITH®

PRIMARY

FOR GREATER CAPACITY



● **Telsmith Jaw Crusher** has a compact, massive cast steel frame and swinging jaw . . . with large cylindrical roller bearings throughout for higher speed, bigger capacity, and lower power requirements. With its vigorous, force feed, and remarkably effective crushing action, the Telsmith Jaw Crusher turns out a more uniform and cubical product, in larger capacities. Its easy, simple adjustment allows a wide product size range. Made in 9 sizes, from 10″ x 16″ to 30″ x 42″, 22 to 240 tons per hour. Send for Bulletin 280.

● **Telsmith Gyratory Breaker** is short and compact. Steel frame and crown, and rigid pillar shaft are all guaranteed against breakage. Largest feed and crushing areas of any gyratory breaker . . . the famous Telsmith parallel-pinch crushing stroke . . . cut steel drive gears, improved full, force-feed oiling and a roller bearing countershaft give not only faster crushing but crushing by impact, for a better cubical product. 7 sizes: 6B to 25B, 26 to 400 tons per hour. Get Bulletin 281.

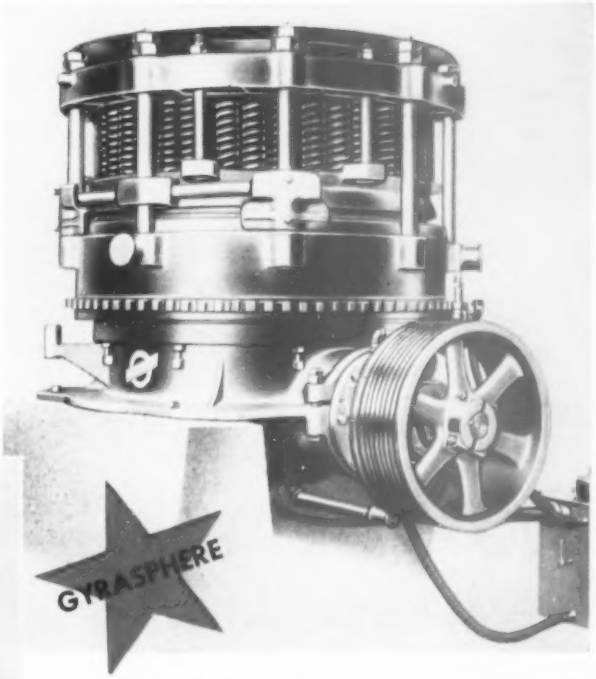
SMITH ENGINEERING WORKS
504 EAST CAPITOL DRIVE, MILWAUKEE 12, WISCONSIN

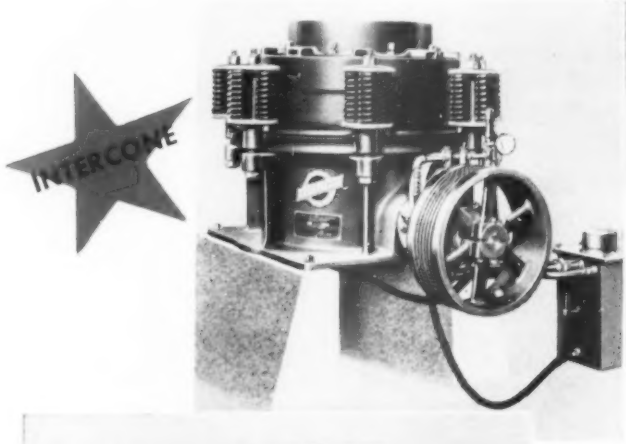
CRUSHERS

SECONDARY

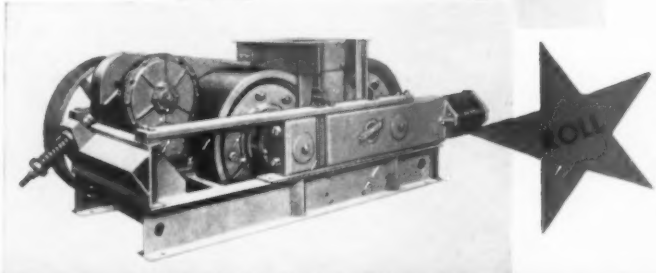
LOWER COSTS • BETTER PRODUCTS

● **Telsmith Style S Standard Gyrasphere** has new, heavier design with many time-tested features for greater capacity, a more uniform product, low-cost operation, and quick accessibility for easier maintenance. 24″ to 48″ sizes, coarse or medium bowl; 45 to 300 tons per hour. New 489-S size has 10″ receiving opening. *Style FC Fine Crushing Gyrasphere* has all Style S features with several additional fine crushing improvements. 24″ to 48″ sizes; medium or fine bowl, 15 to 125 tons per hour. Send for Bulletin 274.





● **Telsmith Intercone** is an all-steel, high-speed, lower priced secondary crusher. Turns out very uniform, cubical, coarse or intermediate product. Lead bronze bearings, Telsmith patented rotary seal, roller bearing countershaft, full force feed oiling, spring relief protection. 18″ to 28″ sizes; 26 to 70 tons per hour. Get Bulletin 270.



● **Telsmith Double Roll** for large capacities of intermediate or fine aggregate at low reduction ratios. Compact, light in weight, low in cost. Anti-friction bearings run in oil. 24″ x 16″ to 40″ x 22″ sizes. 75 to 132 tons. Get Bulletin 282.

Cable Address: Telsmith, Milwaukee

51 East 42nd St. New York 17, N. Y. · 211 W. Wacker Drive Chicago 6, Ill. · 715 Commercial Trust Bldg. Philadelphia 3, Pa. · 238 Main Street Cambridge 42, Mass. · Bucyrus Equipment Co. Milwaukee 3, Wis. · The McLean Co., 3335 Lakeside Ave. Cleveland 14, Ohio

Marcus Equipment Co., 452 Main St., Rochester, Mich. • Clyde Equipment Co., Portland 9, Ore., & Seattle 4, Wash. • Mines Equipment & Engineering Co., San Francisco 4, Calif.

Rish Equipment Co., Charleston 22, & Clarksburg, W. Va.—Roanoke 7, & Richmond 19, Va. • Interstate Equipment Co., Statesville, N. C.

SC-8

"Dodge makes hauls some other trucks can't handle!"

says **John S. Scofield,**
Scofield & Co.,
Freeport, Illinois

"We haul sand and gravel, and do general contract hauling throughout the Freeport area," says Mr. Scofield. "The highways are hilly, and 30% of our work is off the roads. It takes a rugged truck to stand up in this area. As far as we're concerned, Dodge tops the list!

"We keep complete individual records on each of our trucks and have found that Dodge is by far the lowest cost to operate. In fact, our Dodge costs us .6 of a cent less per ton-mile than our next closest truck!

"What's more, Dodge makes hauls some other trucks can't handle . . . *with a full load and a lot of uphill climbing!* Our next truck will be a Dodge."

Mr. Scofield's enthusiastic praise is typical of hauling men everywhere when it comes to Dodge *"Job-Rated"* trucks. Through experience, they've found that a Dodge hauls heaviest loads with cost-cutting economy . . . because it's *"Job-Rated"* to fit the job and to give longer truck life.

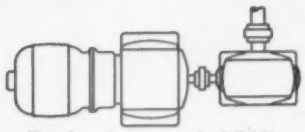
Further, they have found, for example, that Dodge provides a high-powered, high-compression engine that takes their toughest jobs in stride. They've discovered, too, that a Dodge carries bigger payloads without overloading, thanks to better weight distribution. And add to this such Dodge economy advantages as four-ring pistons with chrome-plated top rings, exhaust valve seat inserts and, on high-tonnage models, optional twin carburetion and exhaust system!

Certainly you, too, will want to profit from all the extra value you get with extra-powerful Dodge *"Job-Rated"* trucks. And the man to see for the full lowdown is a neighbor of yours—your friendly Dodge dealer. He's a mighty nice guy to do business with any time.

DODGE "Job-Rated" TRUCKS

Ask yourself these speed reduction questions . . .

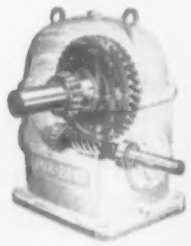
1 Do I want high-ratio reduction with right-angle takeoff?



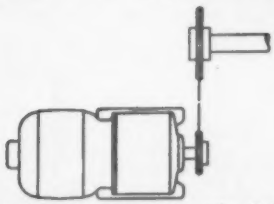
Drawing shows motorized P.I.V. variable speed and worm gear drives direct-coupled.

Then your answer is a LINK-BELT Worm Gear Drive

Reduction ratios: 3.1:1 to 8000:1
Torque: 1,400 to 123,000 in. lbs.
Output shaft rpm: 0.22 to 564



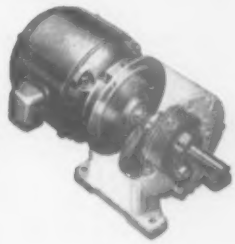
2 Is space at a premium?



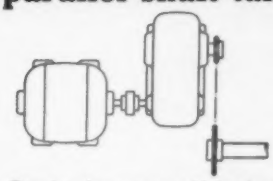
Drawing shows gearmotor with roller chain drive.

Then your answer is a LINK-BELT Gearmotor

Reduction ratios: 6.2:1 to 292:1
Hp range: 1 to 30
Output shaft rpm: 6 to 280



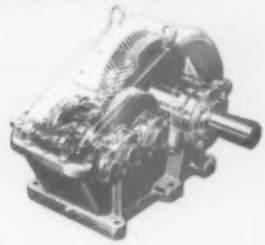
3 Will I need high hp capacity with parallel shaft takeoff?



Drawing shows motor with herringbone gear and roller chain drives

Then your answer is a LINK-BELT Herringbone Gear Drive

Reduction ratios: 2.84:1 to 318:1
Hp range: ½ to 1000
Output shaft rpm: 2 to 600



Yes, LINK-BELT builds all 3

WHATEVER factor governs your speed reducer selection—ratio, space, shaft position, shock loading—you can get the exact answer to your needs from Link-Belt's complete line of enclosed gear drives.

For Link-Belt builds a full range of sizes and ratios in all three types—Helical, Herringbone and Worm. When a Link-Belt power transmission engineer analyzes your conditions, he can recommend the specific drive to meet your specialized requirements.

For complete information, call the Link-Belt office near you.

LINK-BELT

ENCLOSED GEAR DRIVES

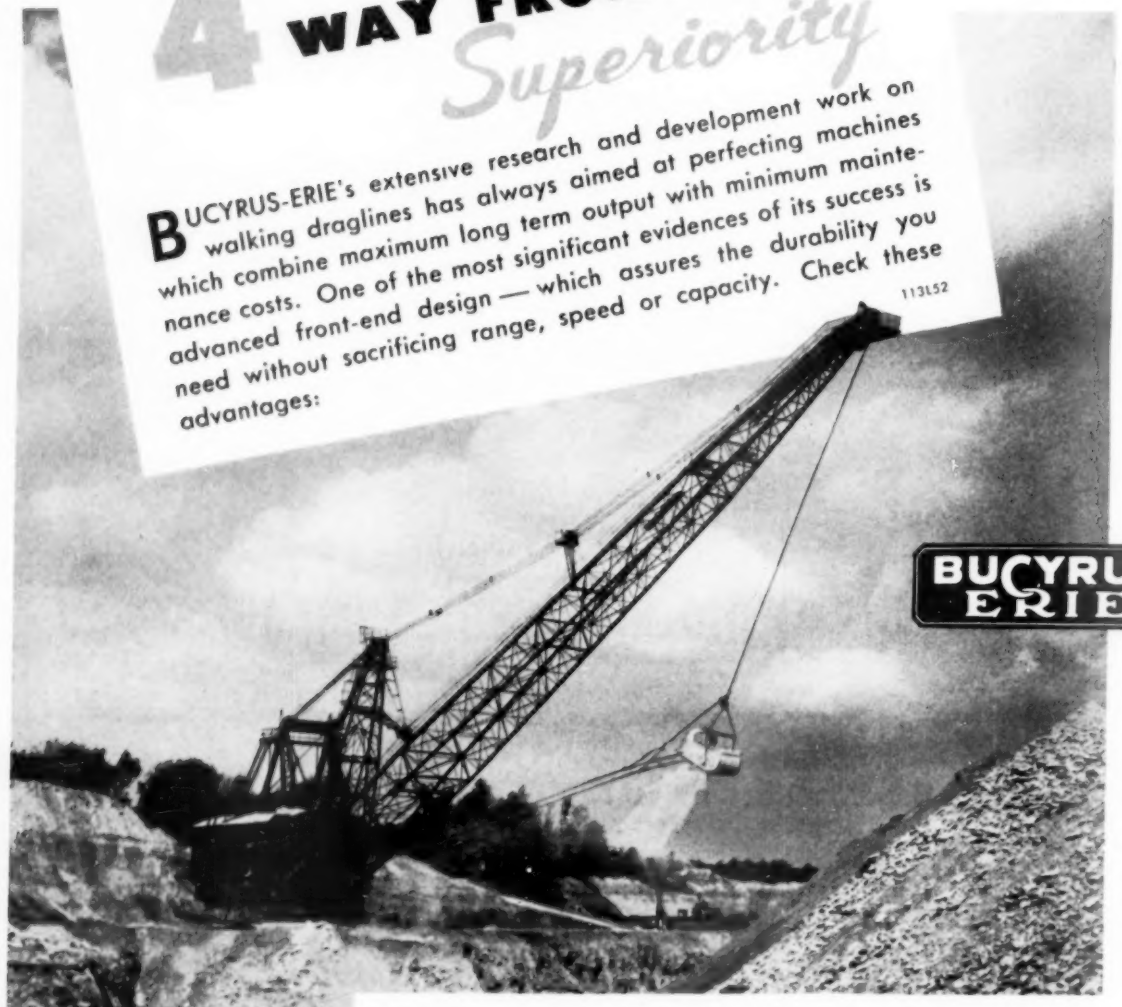
LINK-BELT COMPANY: Chicago 9, Indianapolis 6, Philadelphia 40, Atlanta, Houston 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8, Springs (South Africa). Offices, Factory Branch Stores and Distributors in Principal Cities. 52.659

For Big Output on Big Jobs . . .

4 WAY FRONT-END *Superiority*

BUCYRUS-ERIE's extensive research and development work on walking draglines has always aimed at perfecting machines which combine maximum long term output with minimum maintenance costs. One of the most significant evidences of its success is advanced front-end design — which assures the durability you need without sacrificing range, speed or capacity. Check these advantages:

113L52



● Bucyrus-Erie 650-B walking dragline stripping overburden in a limestone quarry shows unique front-end design which has made it a standout for stripping operations.

1. **STRONG, LIGHTWEIGHT BOOM** — All-welded tubular laced design means less inertia to overcome . . . greater speed in the work cycle.

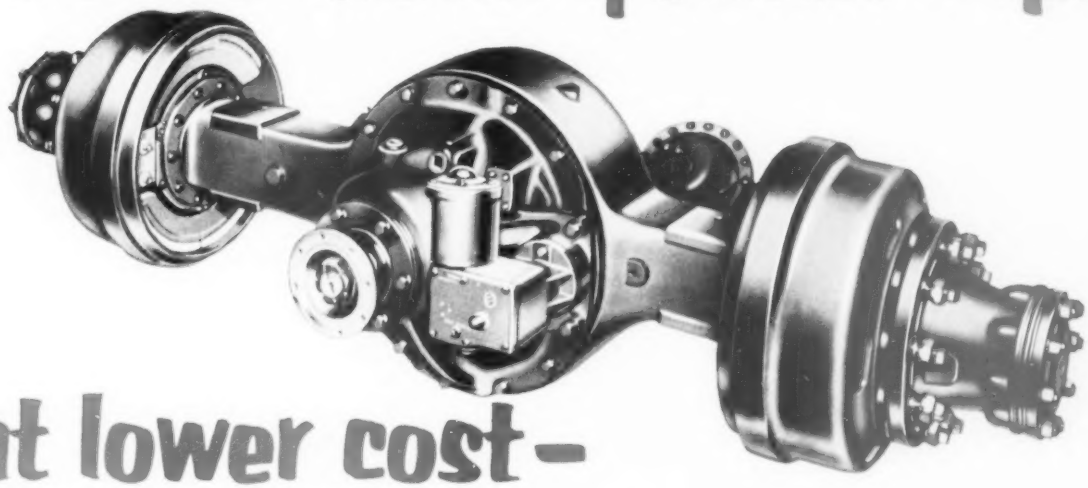
2. **SWIVELING BOOM POINT SHEAVES** — assuring proper lead for hoist ropes in all digging, swinging, dumping positions . . . eliminating excessive rope wear.

3. **TWIN DRAG ROPES ON LARGER SIZES**—keep bucket stable throughout digging . . . aid in fast filling; also allow use of smaller size cable for better rope-sheave ratios, longer rope life.

4. **OUTSTANDING FRONT-END BALANCE** — Each different length boom is so accurately balanced with the rest of the dragline and with the correct size bucket that high output can be sustained not just for a matter of days . . . but month-after-month, year-after-year.

BUCYRUS-ERIE CO., South Milwaukee, Wisconsin

EATON 2-Speed equipped Trucks make quicker trips



at lower cost– last longer, are worth more on the trade-in

With Eaton 2-Speed Axles drivers select the gear ratio best suited to road, load, and traffic conditions—the ratio for maximum economy, safety, and maneuverability. Quicker trips with full loads mean more payload miles at lower cost per mile. Engines run in the most efficient and economical speed range, reducing stress and wear on engines and all power transmitting parts. Trucks stay on the job, out of the repair shop. Thousands of miles are added to vehicle life; trucks are worth more when they are traded in.

Let your truck dealer explain how Eaton 2-Speeds will enable your trucks to haul more, faster, longer, at lower cost.

EATON

2-Speed Truck AXLES

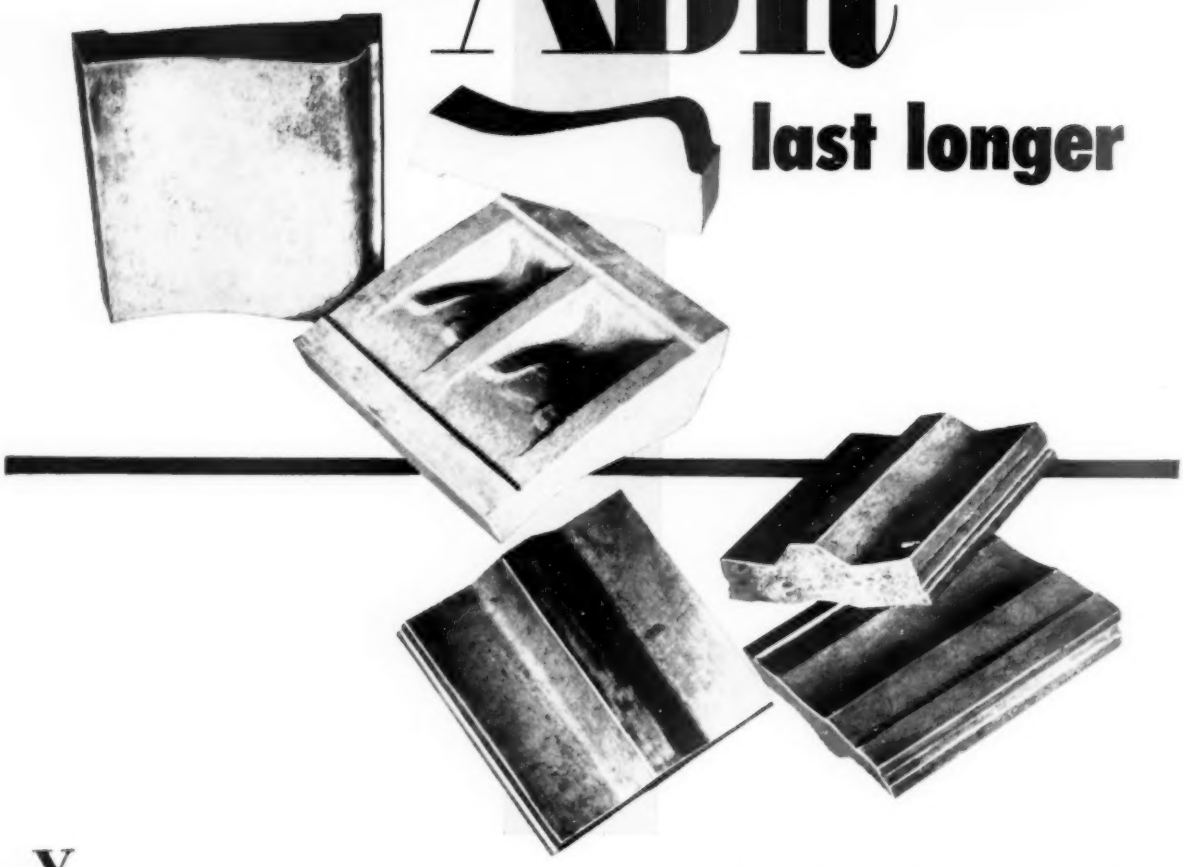
Axle Division
EATON MANUFACTURING COMPANY
CLEVELAND, OHIO

INSIST ON ADEQUATE ROADS

EATON

Today, America's roads are crowded with twice the traffic they were designed to carry. Help end the national traffic jam by speaking up for more and better roads.

cement mill liners in ABK METAL last longer



You can cut replacement cost of liners in primary, secondary or tertiary compartments—for wet or dry grinding of raw stone or finished product—with ABK Metal abrasion resistant liners.

Here are typical reports from operators who have experienced real savings. "ABK Metal outlasted chilled white iron 2.9 to 1". . ."ground an additional 1.5 million barrels before replacement" . . . "ABK liners tripled our interval between relinings" . . . "less downtime for replacements and lower labor maintenance costs".

Moreover, ABK liners maintain desired contours, providing maximum agitation and grinding motion in the mill.

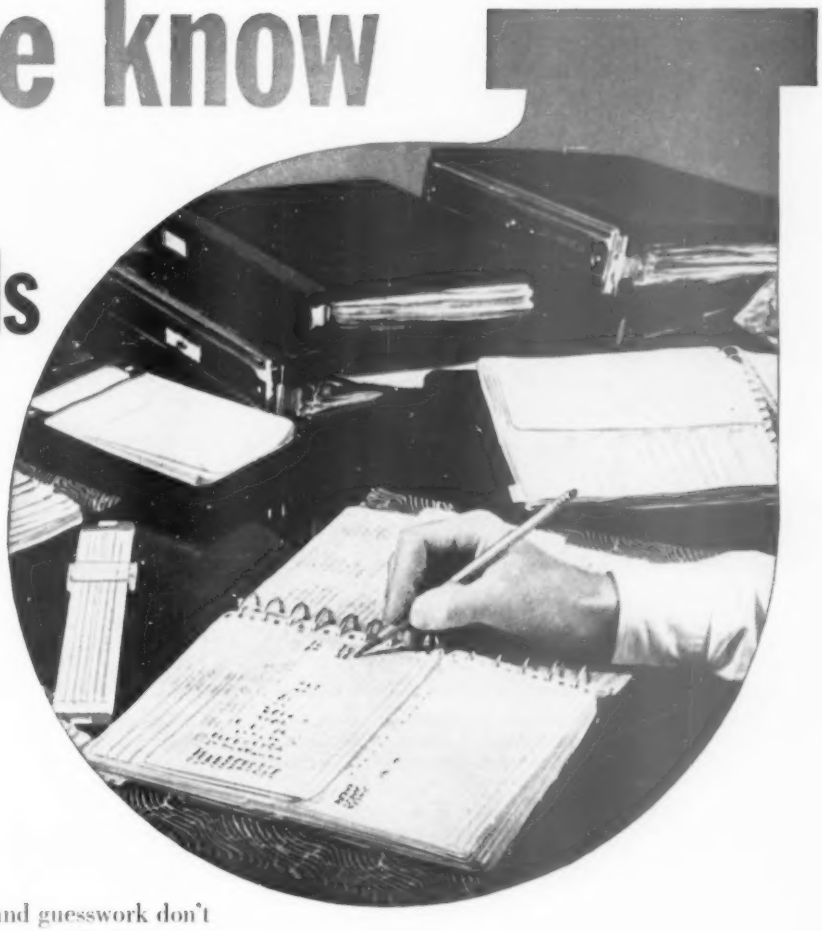
Let us show *you* how ABK Metal—a nickel-chrome alloy of controlled structure with an extreme hardness (500-700 Brinell, as required)—can lower costs and improve performance in your mills.

for better protection against abrasion specify ABK METAL

AMERICAN Brake Shoe COMPANY

BRAKE SHOE AND CASTINGS DIVISION
230 Park Avenue, New York 17, N. Y.

How we know what Hydroseals will do for you



Engineering and guesswork don't get along very well together—at least, not for long. To keep guesswork out of Hydroseal engineering, we've kept complete performance records on almost every pump we've sold. These records contain a description of the pump, its operating conditions, power requirements and all repair parts ordered. Naturally, almost every conceivable pumping condition is included, and the biographies cover a span of years. In most cases, users have found that Hydroseals have paid for themselves in less than a year in power savings alone, with lowered maintenance costs an additional bonus. If you'd like to know what a Hydroseal will do under *your* specific conditions, write us.

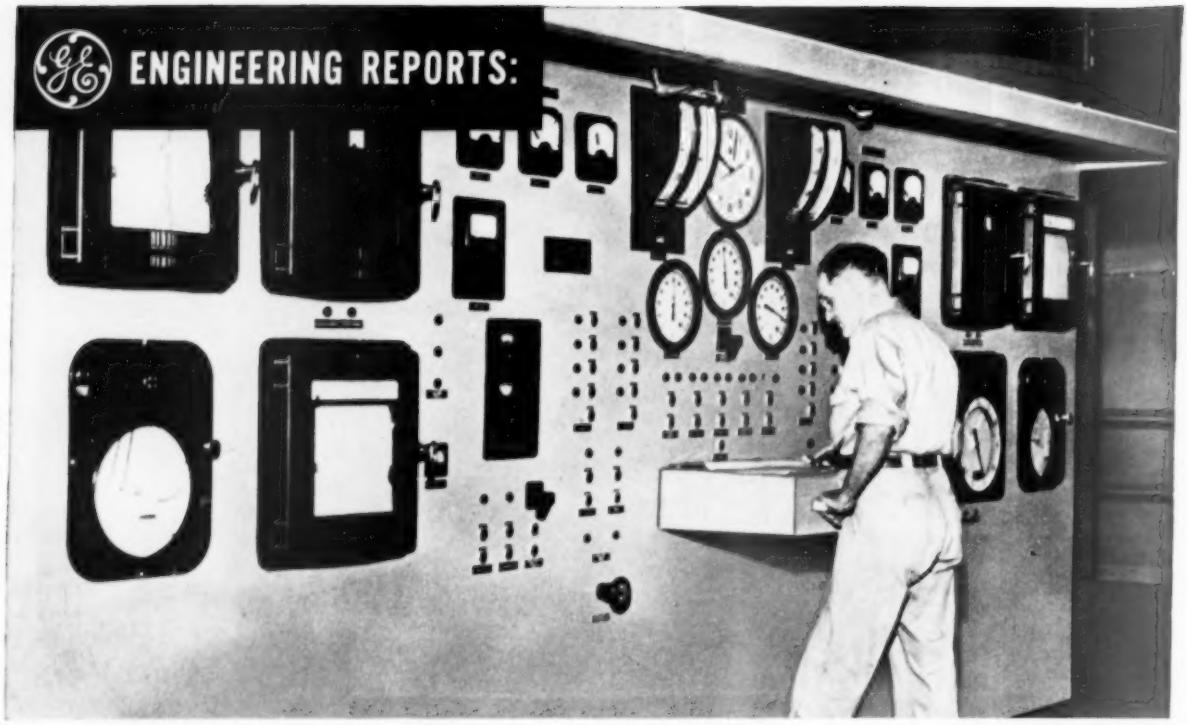
Vertical pumps, too

Ask for Catalog No. 552

THE ALLEN-SHERMAN-HOFF PUMP CO.
Dept. E–259 E. Lancaster Ave., Wynnewood, Pa.
Representatives throughout the World

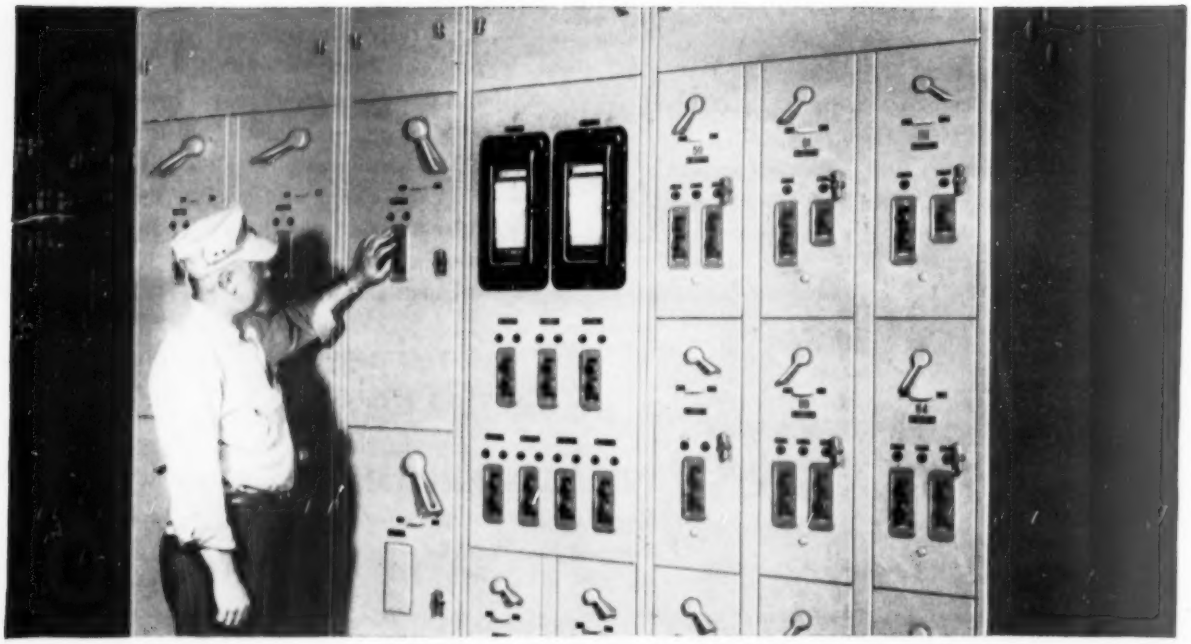
HYDROSEAL SAND, SLURRY & DREDGE PUMPS
MAXIMIX RUBBER PROTECTED

HYDROSEAL, PACKLESS AND MAXIMIX DESIGNS ARE COVERED BY PATENTS AND APPLICATIONS IN THE MAJOR MINING CENTERS OF THE WORLD



ONE MAN REGULATES all kiln-department functions at a control board in this large western cement plant. Built-in instruments indicate and record necessary data on all department drives, kiln temperatures, gas pressure, etc. The multiple-control panel has interlocked circuits so that kiln operations will be performed with greater efficiency and safety.

Centralized control increases



CENTRALIZED CONTROL for a number of 440-volt motors can be provided by a compact assembly of low-voltage G-E Cabinetrol*. Factory wired, it's easily planned, installed and serviced. Rigid steel enclosure gives workers maximum protection, resists entrance of cement dust.

*Registered trade-mark of General Electric Co.

MANPOWER-SAVING, this G-E control station in a Colorado cement mill brings all related processes in a department under control of one man, provides faster, more uniform production.

SPACE-SAVING, this G-E Limitamp high-voltage motor control combines starters and short-circuit protection in one unit. This lineup controls four 4160-volt synchronous motors.

cement output, saves manpower

Modernizing electrically with centralized control lets you co-ordinate plant operations more closely

Centralized control—as part of a comprehensive program of electrical modernization—can help you make most efficient use of your available manpower. It takes fewer steps by fewer men, for example, to co-ordinate related operations in a cement plant from General Electric control stations. And with interlocked G-E multiple control panels, you can help prevent production tie-ups, keep plant processes flowing evenly.

SYSTEM-ENGINEERED TO YOUR NEEDS

Engineered by skilled G-E industry specialists into a complete system to meet your individual needs, these centralized controls play a big part in moving uniform-quality cements through your plant—continuously, at a maximum rate, with minimum man-hours. Whatever department you plan to modernize—crushing, grinding, kiln, finish, or packhouse—let a G-E cement-industry specialist work with you from the start in planning an electric system that is reliable, safer, amply suited to your requirements.

MODERNIZE STEP BY STEP

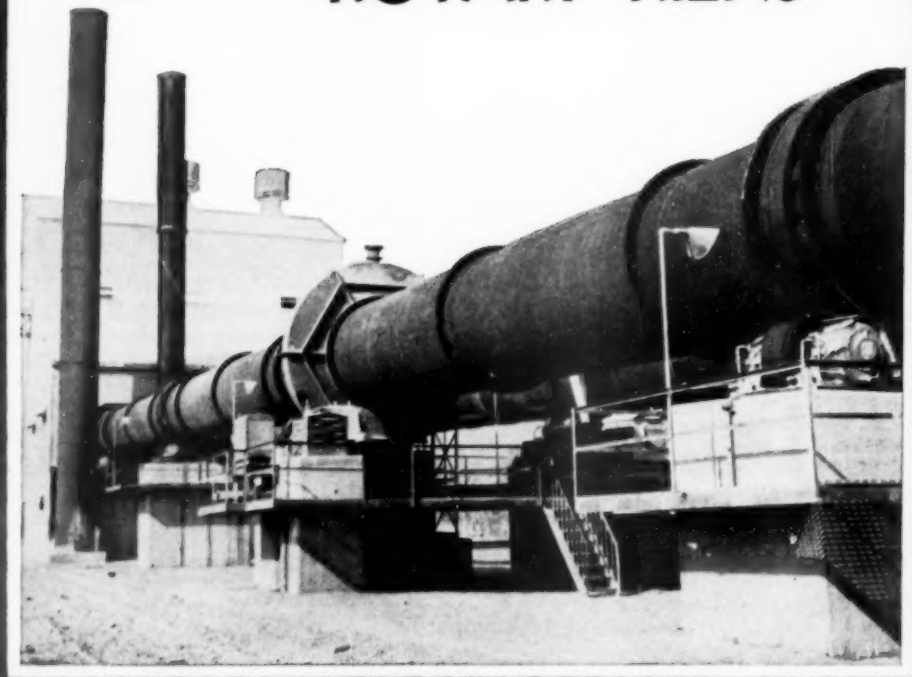
Meanwhile, for mill-tested ideas you can use to increase your plant's capacity, send for a new G-E booklet just released. It shows how to modernize electrically to increase tomorrow's production, how to do it step by step to keep today's production going. For your copy, contact your nearest G-E Apparatus Sales Office and ask for Bulletin GEA-5469, or write to General Electric Company, Section 658-9, Schenectady 5, N. Y,

Engineered Electrical Systems for Rock Products Industry

GENERAL ELECTRIC

SMIDTH

ROTARY KILNS



Smidth machinery has been supplied to over 70 countries of the world including 1000 rotary kilns and 5000 grinding mills, plus auxiliary machines such as coolers, agitators, washmills, pumps, conveyors, packers, separators, etc. for use in Cement, Lime and Ore plants.

For Smidth Machinery apply to:

F. L. Smidth & Co., A/S Vestergade 33, Copenhagen K, Denmark	F. L. Smidth & Co. 11 West 42nd Street New York 36, N. Y.	F. L. Smidth & Co., Ltd., 105, Piccadilly, London, W. 1, England
F. L. Smidth & Cie France 80 Rue Taitbout Paris (9e) France	F. L. Smidth & Co. of Canada, Ltd. 11 West 42nd Street New York 36, N. Y.	F. L. Smidth & Co. (Bombay) Ltd. 42 Queen's Road Bombay, India

"WE HEAR..."

November, 1952

The steel industry's record production of 105,000,000 tons of ingots and steel for castings in 1951 produced still another record in its consumption of raw materials. About 36,000,000 tons of limestone were used by the steel industry in 1951, nearly 3,000,000 tons more than in 1950. All but 5,600,000 tons of the 1951 total was used in blast furnaces. Other raw material consumption included 130,000,000 tons of iron ore; 100,200,000 tons of coal; 68,000,000 tons of coke; 2,500,000,000 gal. of fuel oil; 207,000,000,000 cu. ft. of natural gas; 58,000,000 tons of scrap; and an electric power consumption of 27,611,000 kw.-hr.

* * * * * * * * * *

The construction of approximately 840,000 homes a year for the next five years, or a total of 4,200,000 homes, has been predicted by Investors Diversified Services, Inc., one of the nation's largest residential construction and mortgage lending institutions. Even though 4,000,000 new homes have been built during the past three years, several factors are expected to keep demand at fairly high and stable levels for the next five years, such as: a higher percentage of married couples are becoming homeowners because of increased ability to buy; shifts in population through migrations to the west, south and southwest will create increasing housing demands in the areas affected; replacement of sub-marginal housing units, which are becoming obsolete at the rate of 100,000 or more each year, will boost home-building activity; replacement of the approximately 100,000 homes which are destroyed by fire or other hazards each year; and, with the increasing life-expectancy rate, many married couples of retirement age will be planning and buying "retirement" homes especially suited to the needs of their later years.

* * * * * * * * * *

Army engineers have allocated $40,000 for the Fernbank dam project at Markland, Ind., which is a part of the $265,000 appropriation for navigation and flood control projects in Ohio, Kentucky and Indiana. The Fernbank allotment brings the total thus far appropriated to $199,500. Estimated cost of the locks and dam is $69,500,000.

* * * * * * * * * *

The National Production Authority has eased restrictions on use of aluminum and copper in construction and the ban on their use in drains, gutters, down spouts, unit heaters and in ornamental metal work has been removed. The following quantities may now be self-authorized each quarter: industrial buildings, 4000 lb. of aluminum and 5000 lb. of copper; public buildings, stores and commercial structures, schools, hospitals, apartment houses, and certain other houses, 2000 lb. of aluminum and 1000 lb. copper; and highways, 500 lb. of aluminum and 500 lb. of copper.

* * * * * * * * * *

A new mineral fiber, made of aluminum oxide and sand, which is said to withstand temperatures that would melt cast iron, is a new potential source for industrial furnace linings. According to Carborundum Co., which developed the new material, because of its superior insulating qualities, it requires 30 percent less electric power to maintain a furnace at a temperature of 2500 deg. F. than does brick, and the time required to bring the furnace to this temperature is cut in half. Its basic uses at present are as insulators against high temperatures and electricity and as a filter in chemical plants. It is being used as insulation around combustion and exhaust systems of jet airplane engines where tremendous heat is generated, and it also has possible use as an insulation for cables subject to atomic radiation. A $500,000 plant is presently being built to produce the fiber.

WE HEAR

Construction contract awards for expansion of the U.S. Atomic Energy Commission's gaseous diffusion plants at Oak Ridge, Tenn., and Paducah, Ky., were recently announced. A $464,000,000 addition at Oak Ridge will be built by Maxon Construction Co., Dayton, Ohio. At Paducah, the prime contract on a $459,000,000 addition to the uranium-235 separation plant has been awarded to F. H. McGraw and Co., Hartford, Conn. Carbide and Carbon Chemicals Co., a division of Union Carbide and Carbon Corp., will operate both new plant additions. Funds for the Oak Ridge and Paducah expansions were included in the 1953 Independent Offices Supplemental Appropriation Act which appropriates a total of $2,986,894,000 for A.E.C.

* * * * * * * * * *

In recent road tests, truckers have reported increases in non-skid mileage up to 36 percent with use of new truck tires said to combine better traction for driving and improved non-skid characteristics for braking. The new tire, developed by Firestone Tire & Rubber Co., is said to have a stronger, gum-dipped cord body construction; a wider and flatter tread design; extra strong beads; a "functional" shoulder design which resists scuffing; deep groves for rapid dissipation of internal heat; and a new long-wearing tread compound.

* * * * * * * * * *

It has been predicted that within the next year or two, Congress will pass legislation which will give the government control over atmospheric pollution, much on the same basis as it now governs stream pollution. A Joint Resolution has already been passed which would provide for intensive research and investigation pertaining to causes, effects, and means of prevention and control of air pollution.

* * * * * * * * * *

Generating capacity of privately owned electric utilities has been increased from 40,300,000 kilowatts to 60,100,000 during the period of 1946-1951, at a cost of approximately $10,000,000,000, as recently reported by U.S. News & World Report. Another 21,600,000 kilowatts is to be added by the end of 1954, which will mean a doubling of capacity since the end of World War II. A further possible rise of 60,000,000 kilowatts by 1960 has been predicted by the National Association of Electric Companies.

* * * * * * * * * *

Contract awards for heavy construction, nationally, totaled $12,256,008,000 for the first 39 weeks of 1952, compared with a total of $10,724,442,000 for the comparable period of 1951, as reported by Engineering News-Record. Private mass housing awards are continuing high with a 39-week total of $2,278,700,000, or 56 percent above the same period of 1951. Highway awards of $1,164,000,000 are 27 percent above the corresponding 1951 period.

* * * * * * * * * *

Plans and specifications are under way for Monticello dam, a part of the California Solano project which will be located in Putah Creek canyon, west of Winters. Congress recently alloted $3,000,000 to the project but specified that the money could be used only for plans and specifications until pending legislation determines whether the development should be a part of the Central Valley project. The Monticello dam will have a concrete arch structure 276 ft. high, above the bed of Putah Creek at Devil's Gate. The crest will measure 1017 ft. in length.

* * * * * * * * * *

Coal consumption in the United States is expected to reach 800,000,000 tons annually within the next 25 years, and may even go higher, according to a recent report of the President's Materials Policy Commission. Present coal consumption is 500,000,000 tons annually.

* * * * * * * * * *

Construction contract awards in the 37 states east of the Rockies totaled $9,269,863,000 for the first seven months of the year, or 9 percent below the corresponding period of 1951, according to an F. W. Dodge Corp. report. Residential awards of $3,952,115,000 were up 2 percent; non-residential awards of $3,261,661,000 were down 29 percent; and public and private works and utilities, totaling $2,056,087,000, showed a 20 percent gain. Total construction awards for the month of July amounted to $1,511,285,000, which was a 2 percent gain over June and a 10 percent gain over July, 1951.

THE EDITORS

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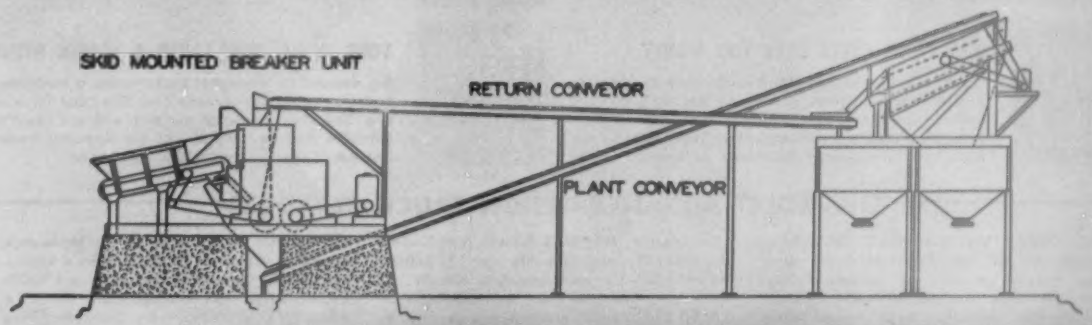

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Big demand for Chevrolet trucks means a traditionally higher price when you trade your Chevrolet for a new one. You save money all the way with a Chevrolet—from the day you buy it until the day you trade it. See your Chevrolet dealer now—and save!

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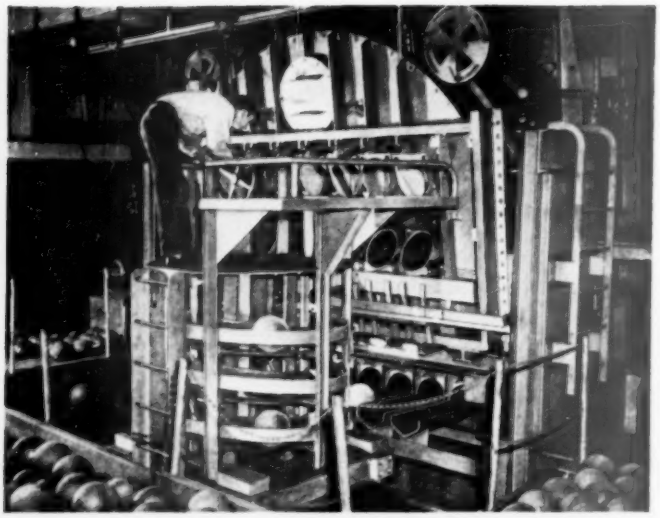

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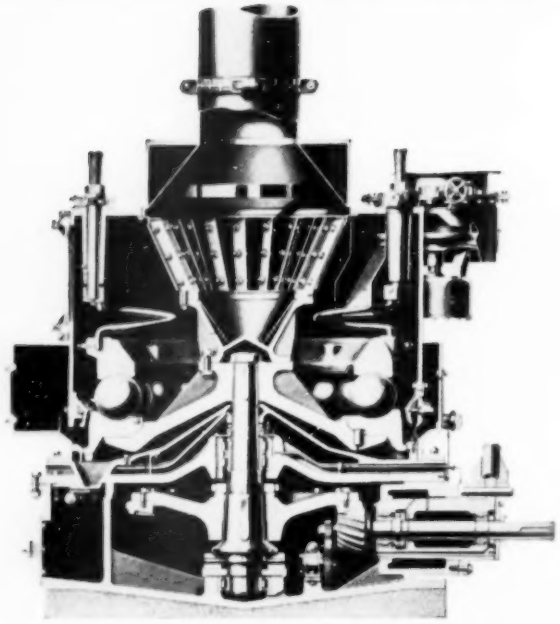

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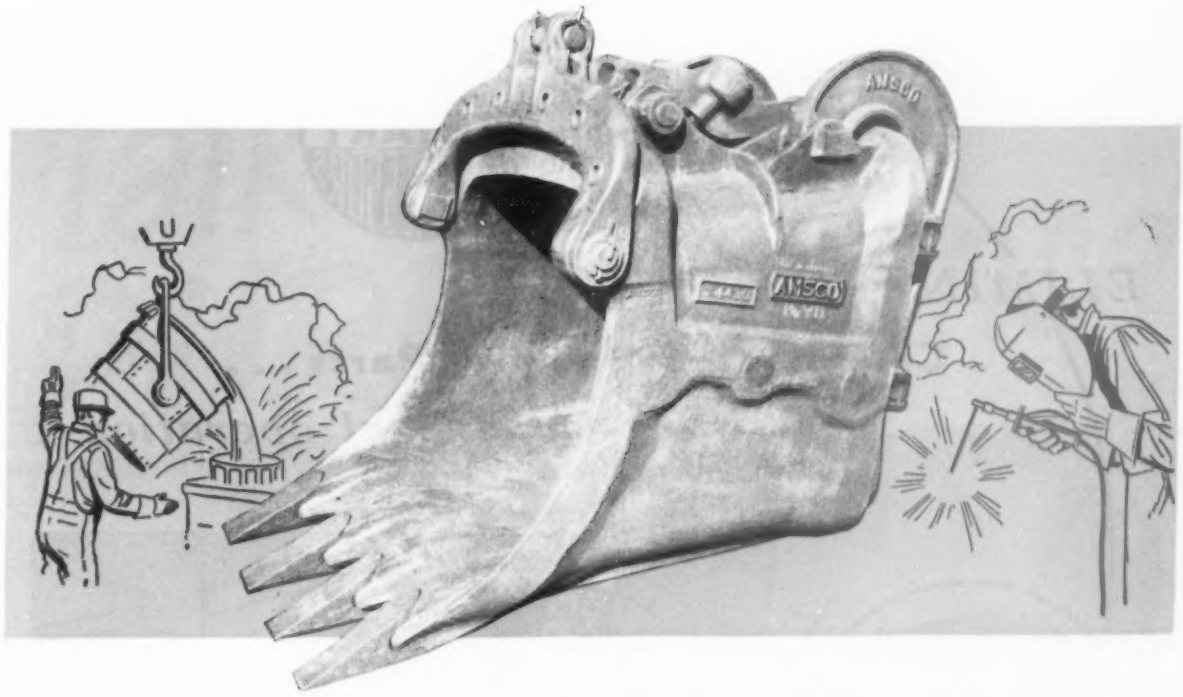

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How service and manganese steel are cast and welded into **AMSCO** Dippers

More than 5,000,000 cubic yards of rock and abrasive materials have been dredged by one AMSCO All-Manganese Steel Dipper similar to this 1¾-yard model —and the end of its service is nowhere in sight!

Service like this is expected—and considered normal—by users of AMSCO Dippers. Just as users throughout all industry know that AMSCO Manganese Steel Products mean service and long life wherever impact and abrasion must be controlled. AMSCO Manganese Steel has the unique quality of actually becoming harder with use, acquiring a high surface polish to shrug off grinding abrasion, while retaining body metal toughness.

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Check these additional PLUS features:

- **One-piece Manganese Steel back casting.**
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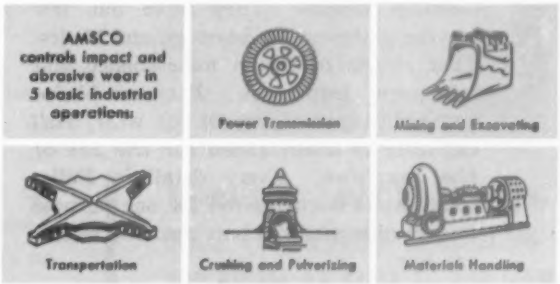
- **Teeth are set for clean, fast digging.**
- **Interior is smooth and slightly tapered for free dumping.**

Contact your shovel manufacturer about AMSCO Dippers, or write AMSCO, Chicago Heights, Illinois.



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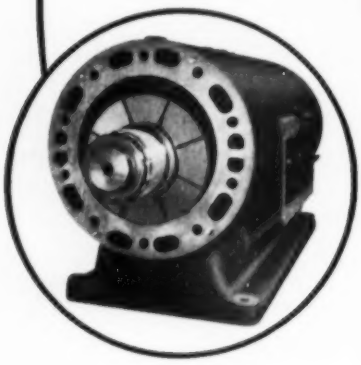

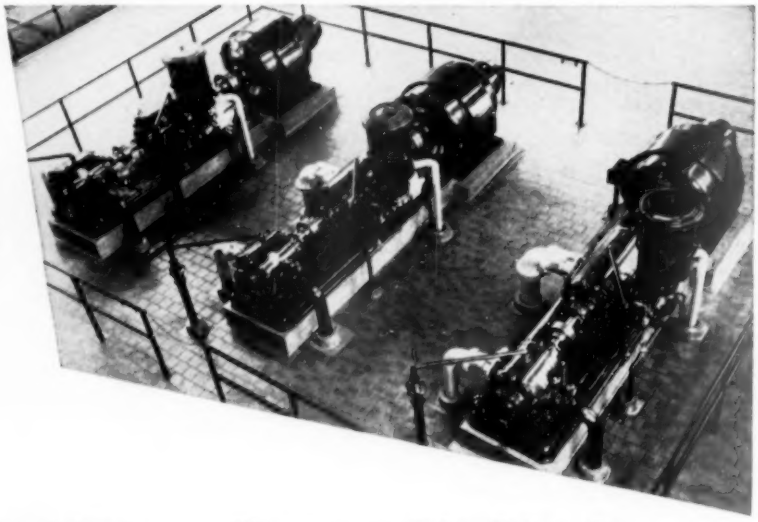

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C-216

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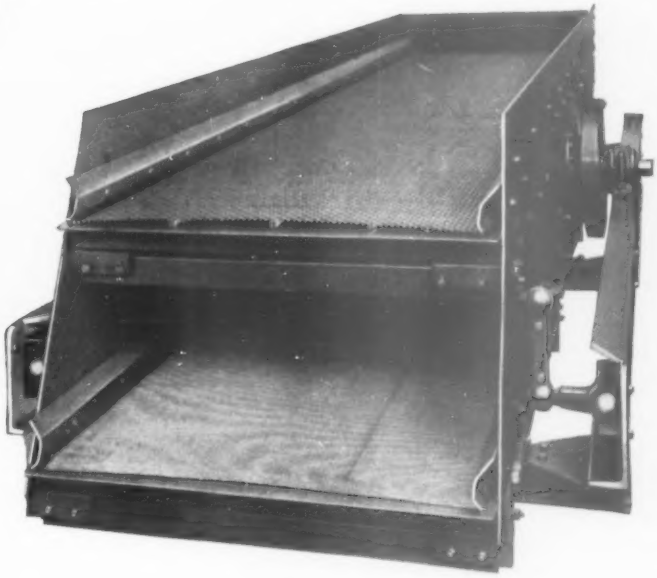

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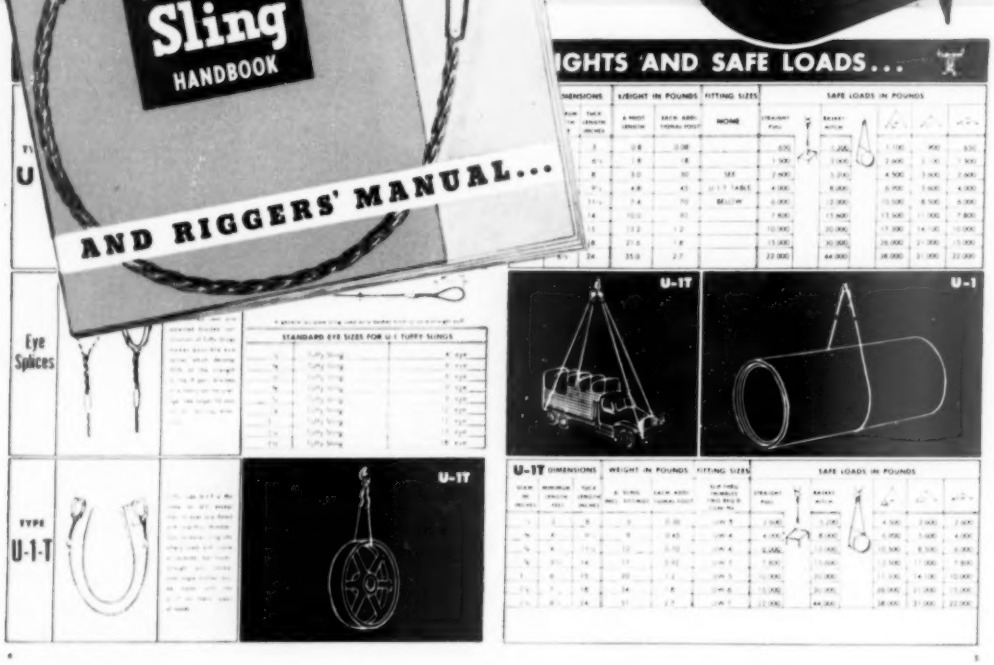

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Editor's page . . . . .

Industry complaints a threat to future operations

OUR REGULAR SOURCES of spot news from all over the nation reveal a very decided trend toward more and more criticism of the rock products and concrete products industries by the public and public officials, in communities widely scattered over the country. No geographical section is immune and no single producer need feel that he alone is being singled out for attack.

This menace to continued profitable operation is gaining momentum and is taking many forms in its attacks. First, and probably foremost, is the influence of zoning laws, which would restrict or forbid operations of aggregates producers in areas which long had been set aside for the purpose because of economics. Ability to extend operations, even into adjoining deposits which have been owned or under lease by a producer long before recent changes to the local zoning laws, is becoming difficult if not impossible.

Contributory to more restrictive zoning laws and to lawsuits are all manner of complaints filed against producers. Among the charges that we read and hear about with increasing frequency are that individual producers are guilty of too much noise and dust, that they permit hazards for children to exist, that they spill gravel and crushed stone on the highways, operate speeding trucks that are dangerous to the public and disregard the rights of surrounding property owners. Blasting is blamed for damage to property and nerves, crushed stone plants are accused of creating "smog" and "ill smells" and night operations are held responsible for injuring health because people cannot sleep. Blasting operations are even being blamed because turkey eggs fail to hatch.

Unfairness of Charges

Undoubtedly some of the charges are true, and those offenders had better take action, out of regard to the public interest and before they find their rights to stay in business challenged. However, many reputable and responsible producers are being put on the spot even where they have gone to great expense in the application of up-to-date engineering knowledge to eliminate potential sources of complaints in their operations.

As far as zoning laws go, it is granted that population growth is causing urban encroachment upon rural areas, but many of the ordinances are purely restrictive measures that do not serve their communities best. They very often are unreasonable in their restrictions and do not give adequate recognition to the economic considerations that are vital to most effective land utilization for the good of all. Too often, we fear, the pure cussedness of anti-industry segments of a community is aroused and fanned into action without full facts because those complaining don't want facts.

In reading the testimony of plaintiffs in many of the cases coming to our attention, it is plain that industry is considered a stepchild whereas it really is the backbone of a community. It still provides the employment and pays the heavy taxes, which contributions used to be considered important.

Agitation has resulted in newspapers terming plants to be nuisances where subsequent investigation by authorities has revealed findings that required apology. That happened only recently to a concrete products plant in the southwest which is one of the finest operations anywhere. Dust in the street from other industries was found to blame. Others including cement plants and crushed stone plants have had to carry the brunt in dust litigation cases where nearby large industries have been the offenders. Plants of all types in this industry have been termed noise-makers when the amount of noise emitted is no more than that from ordinary highway traffic and less than that from passing trains.

Those who complain would have them move to more distant locations but would they really want to pay the penalty in dollars for having essential construction materials shipped in from distant sources?

A Wisconsin sand and gravel producer has met the challenge by setting aside a cent per ton of production in a special account to the city for after-treatment of the land when his deposit is depleted. The land will become a city park. A producer in New York State has gained a revision to the zoning laws to permit opening adjacent land, by first agreeing to a program of land rehabilitation. A western producer has "soundproofed" a gravel plant by installing insulation in bins and by erecting sound barriers, to the satisfaction of the local community. Others have paved driving areas and gone to other expense as evidence of a desire to cooperate.

Actions such as these as part of a continuing program of public relations to tell the industry story are the only answers to a serious problem.

Bror Nordberg

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Thermoid's long experience and continuing research *in the field*, pays off with real economy, maximum efficiency and greater tonnage for your belting dollar. Regardless of the size or kind of material —light or heavy, soft or abrasive, hot or cold, wet or dry—whatever the job, it's a good bet that Thermoid has solved the same or a similar problem with a belt that will do the job better.

In most cases, your Thermoid distributor can select the belt that will serve your needs most economically. Where unusual conditions exist, he will call in an experienced Thermoid sales engineer.

Get in touch with your Thermoid distributor or write direct for a copy of the Thermoid Conveyor Belting Catalog No. 3679.

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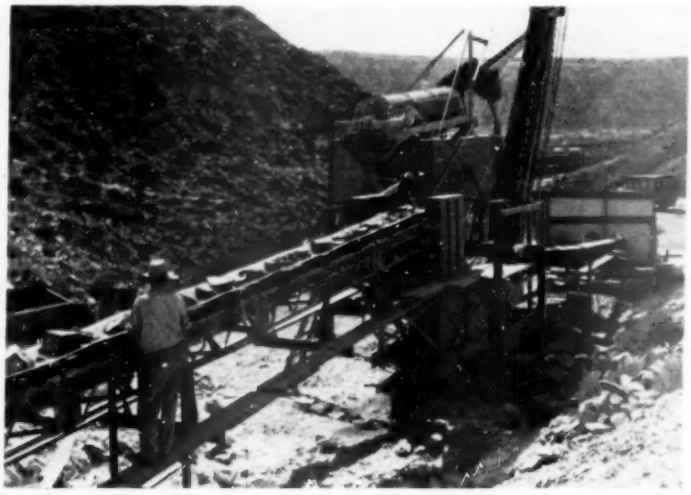

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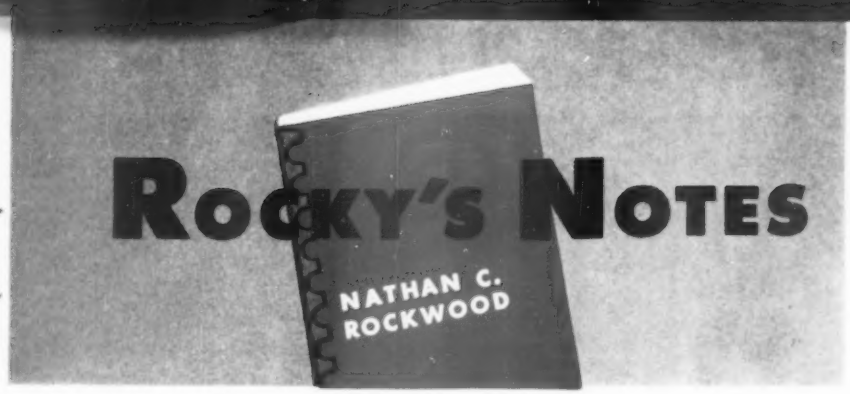


A voice of labor on Taft-Hartley Act

PROBABLY LIKE MANY other journalists we have believed organized labor's opposition to the Taft-Hartley Act arose from a misconception of its purposes, and that labor union bosses have deliberately promoted these misconceptions for their own obvious reasons. To any one who has taken the trouble to read the provisions of the act it is easy to see why labor union bosses do not like some of them. These are provisions honestly designed to preserve a little bit of democracy in labor unions, instead of permitting the entire management of them to a controlling clique, which almost invariably is self-perpetuating. We have seldom or never seen labor union bosses' arguments which bore any resemblance to logic.

An interesting exception to the usual prattle about the "slave labor" law is an article in the September issue of *The Voice of the United Cement, Lime and Gypsum Workers International Union, A.F. of L.* It is entitled "Disorganizing by Taft-Hartley Rules." Since this is the union which has organized most of the portland cement and numerous other plants in our industries, we believe some extracts from this article will be of more than ordinary interest to our readers. So far as we know this union has an excellent record for honest, intelligent and fair dealing with employers in these industries, and we doubt if the employers have had any hand in the "unethical" practices of which this union complains.

The author of the article is Felix C. Jones, assistant to the general president. It carries an editorial introduction, written we presume by the general president, William Schoenberg. This is quite as interesting as the article itself, since it illustrates the inability or unwillingness of the A.F. of L. to accept responsibility to clean its own house. That, our readers may remember, was one reason for the Taft-Hartley Act; it was aimed to place some responsibility on union officers as well as on employers.

The editorial preface says that the article was submitted first to the Labor Press Association, which is a cooperative news service for union papers, but the L.P.A. rejected it for fear of being accused of "taking sides on matters of organizational and factional controversy." Nevertheless, the editor of the *Voice* thought the story should be told; and for the good of the American labor movement as a whole, we believe he is right, although we do not agree that it is the Taft-Hartley Act which is at fault. The fault, to us, is obviously with the American Federation of Labor management, which wants to dictate national government policy, but at the same time has not the gumption to adopt a policy of its own.

The Union's Squawk

Mr. Jones writes: "There is no difficulty involved in recording the respects in which the Taft-Hartley Act has been most damaging to our International Union. The destructive features of the act, from our standpoint, are not found in the court injunction, secondary boycott, watered-down union shop, filing requirements, employer free speech, union unfair labor practice charges, feather bedding, legal entanglements, and lawsuits provisions. Our union has been damaged and its progress retarded more by the 'disorganizing' features of Section 9(b) (2) and 9(c) (A), relating to the craft unit rule and the determination of collective bargaining representatives. By disregarding old established and all recognized principles of jurisdictional rights, certain unions have been eager to use the Taft act to raid, capture and demoralize established local unions of our organization."

He then reviews how his union was the first and most aggressive in the field, and how *other A.F. of L. unions* have entered the field and pried loose some of these established locals. This has been done under a provision of the Taft-Hartley Act designed to prevent the old well organized craft unions from being submerged in plant-wide or industrial type union contracts. Hence, Section 9(b) (2) provides that the National Labor Relations Board shall give such craft unions an opportunity to have a separate bargaining agency. Prior to the Taft-Hartley Act, the N.L.R.B. had considerable leeway in not disturbing existing union relations, but since it leaned heavily on the side of C.I.O. industry-wide unions, the A.F. of L. was influential in getting these provisions into the Taft-Hartley Act. The other provision of the act was designed to free workers of dominance by a communistic or racketeering union; it provides a way for them to choose another union for collective bargaining.

Mr. Jones proceeds with the following historical resumé: "About 1937, the San Andreas, Calif., employes of the Calaveras Cement Co. were organized by the A.F. of L. as a Federal Labor Union. This group was quite active in the formation of our International Union and became our Local Union 57 in 1939. From 1937 to 1949, this group functioned as a militant local union, maintaining contractural relations with their employer. In 1949, the Stationary and Operating Engineers (A.F. of L.) raided this local union, using a program of deception and confusion buttressed by the unethical provisions of the Taft act. The Engineers destroyed and seized our local union without even the pretense of having contributed anything to the organizational activities of the employes in the cement industry. This is the only group of cement workers in the United States or Canada affiliated with the Operating Engineers. The Engineers have miserably failed to obtain for the Calaveras workers the promised improved collective bargaining benefits.

"A new cement plant commenced operations in Mobile, Ala., in 1946. The workers organized and became our Local 236. By collective bargaining, they promptly obtained the standard contract and wage benefits prevailing in the industry in the southern area. Late in 1950, despite our effective contract with the employer (incidentally the first multi-plant employer in the cement industry to negotiate a company-wide contract and pension plan with our International Union) the Machinists (I.A.M.) attempted to seize our entire Local Union No. 236. This abortive effort failed, but in 1951, the Machinists resumed their raiding under the provisions of the Taft act and captured this entire plant group. This is the only plant-wide group of cement workers on the North American continent held by the Machinists' Union. Nor have they been able to fulfill their promises to do more for this group than our International Union.

"In Baton Rouge, La., we organized the workers of another new cement plant. They obtained all the benefits of our company-wide agreement with their employer immediately. Nevertheless, first the Baton Rouge Building Trades Council Labor Union petitioned the N.L.R.B. for certification as bargaining agent for this group of cement workers. All the time an effective union agreement covered

(Continued on page 104)

GM DIESEL
CASE HISTORY No. 526-25

USER: Aurora Limestone Products Co., Aurora, Iowa, producers of road stone and agricultural lime.

INSTALLATION: GM 3-71 Diesel powers a ¾ yd. Unit shovel, replacing a ¾ yd. shovel powered by a gasoline engine.

PERFORMANCE: GM Diesel powered shovel works faster, feeding crusher about 17% more per day. Fuel consumption averages 4 gallons per hour, saving 33% on operating costs.

THIS DIESEL LOADS FASTER

and costs ⅓ less to operate

A few days after Aurora put this shovel to work, they rented a 2-cycle General Motors 6-110 Diesel for their portable crusher while the old 4-cycle Diesel was in for overhaul. Production increased from 680 tons per day to 800 tons. Fuel costs dropped from $14.00 per 10-hour day to $9.80. Needless to say, the 6-110 now powers the crusher. With power on every piston downstroke, fast accelerating GM Diesels enable equipment to do more work each day. They're quick starting—easy to service and cost less to maintain. That's why users tell us "any machine with GM Diesel power is a better machine." Specify GM Diesels for your equipment.

DETROIT DIESEL ENGINE DIVISION
GENERAL MOTORS • DETROIT 28, MICHIGAN
SINGLE ENGINES 32 to 275 H.P. MULTIPLE UNITS Up to 840 H.P.

It pays to Standardize on

Write for booklet, "A 50,000,000 Horsepower Insurance Policy" that tells you why.

GM
GENERAL MOTORS
DIESEL POWER

LABOR RELATIONS TRENDS

Teamsters' union picketing to enforce area bargaining

By NATHAN C. GOODWIN

THERE ARE BILLS before Congress to prohibit nation-wide collective bargaining by labor unions, the object being to prevent nation-wide tie-ups of an entire industry, such as happened in the recent strike in the steel industry. Most of our industries probably favor passage of such a law, not only to prevent nation-wide tie-ups, but because it is recognized that this kind of power in the hands of a few labor bosses can be, and frequently is, abused. Also, living conditions in various parts of the country vary and there is no economic justification for uniform wage scales on a nation-wide basis. On the other hand some employers are for it because it levels out one item of cost and hence makes competition that much easier; also because it permits organized industry to combat organized labor.

Area bargaining has been practiced with considerable success in the sand, gravel and ready-mixed concrete industries, particularly in the larger metropolitan areas. Producers who have tried this form of collective bargaining universally favor it because the plan permits loaning employes within the group, when necessary, and is thus a stabilizing influence in the general employment situation. One producer temporarily may be extraordinarily busy while a competitor is not, but the employes of both do not suffer from such a situation. Therefore, we believe producers in these industries will resist any attempt to stretch "nation-wide" bargaining to include such local area bargaining. That at least one of the A.F. of L. unions involved in these contracts is enough in favor of such area bargaining to attempt an illegal boycott to bring it about, has been demonstrated by a recent case decided by the Michigan Supreme Court.

Teamsters' Union Pickets

The case was Postma vs. Teamsters' Union, decided September 3, 1952. The plaintiff was Harry F. Postma, doing business as the Postma Sand and Gravel Co., in the Grand Rapids area. This business evidently included ready-mixed concrete as well as aggregates. The case came before the State Supreme Court on appeal by the union, which had been enjoined from picketing the plant of the producer. The employes of the producer had no quarrel with him, in fact they intervened to help their employer in seeking a permanent injunction against the union's picketing. The Supreme Court upheld the decision of the lower court for the plaintiff (Postma company) and made the injunction permanent.

The following paragraphs are direct quotations from the court's decision:

"Defendant union, Local No. 406, is affiliated with the International Brotherhood of Teamsters, Chauffeurs, Warehousemen and Helpers of America, A.F. of L. The individual defendants are Mackey, an officer, and Dertien and Switzer, members of the local. The union does not represent any of the Postma employes, although it has attempted to persuade them to become its members. It does, however, represent employes of other sand and gravel companies in the area.

"In February of 1950, the union had difficulty in negotiating new agreements with the Grand Rapids Gravel Co. and other competitors of Postma. According to the testimony, which was returned on a separate record, the negotiating companies stated that their reason for failing to reach an agreement with the union was that they were unable to increase or even continue prevailing wages because Postma was paying lower wages. The union offered in corroboration of this statement a pay stub of *one* of Postma's employes, showing wages of 82¢ per hour covering one week in 1949, but without any indication of the nature of the employe's work. Intervening plaintiffs (Postma's own employes) testified they were paid wages by Postma ranging from $1.45 to $1.65 per hour; and one of them testified that he was never paid less than $1 per hour, even when he was first employed. The union stated in its answer that the general wage rate in the area for similar work was $1.31 per hour.

"During negotiations with the union, the manager of the Grand Rapids Gravel Co. called a meeting of all gravel producers in the area, which Postma attended. Kleiner, an attorney for the union, was also present. Postma testified that Kleiner urged all gravel companies to sign a blanket contract for all employes. Postma admitted on cross-examination that Kleiner did not offer a contract to be signed at that time, and that the testimony regarding the contract was based upon a discussion which took place at the meeting after Kleiner had left the room."

Purpose of Picketing

"During the progress of the negotiations the employes of certain competing producers requested their union officers to picket Postma company. Defendant Mackey, secretary-treasurer of the defendant union, testified that the purpose of such a picket line was:

"'To let the general public know that we had a dispute; Postma Gravel Co. was unfair, paying a lesser wage in the gravel industry, hoping that we would encourage people that were favorable of the union operators to place their orders to a fair operator that was paying the higher standards of wages and working conditions that exist in this area.'

"This testimony was stricken as immaterial. However, it was printed in full in the record, together with a lengthy colloquy between court and counsel.

"A picket line was established on August 3, 1950, and continued to August 8, when Postma obtained a temporary restraining order. This picket line consisted of two men who walked either abreast or single file on the shoulder of the highway in front of the Postma property. They carried placards reading: 'This company unfair to organized labor.' Mackey testified that the word 'company' was intended to include the employes of Postma as well as the company, and not to mean that Postma was unfair to his own employes. The union offered to change the wording of the sign if it was deemed inaccurate.

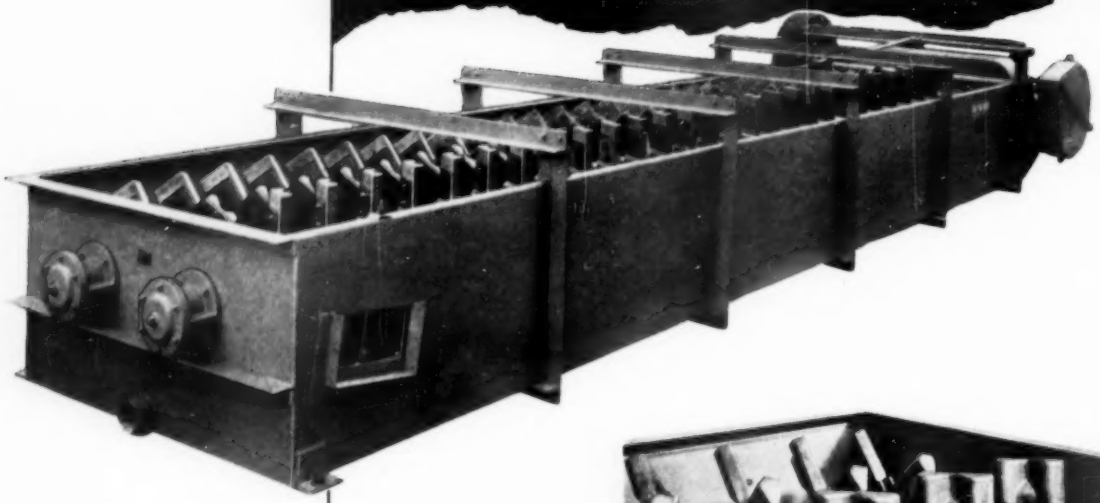
"The trucks of Postma use the shoulder of the highway in going from one part of Postma's premises to another. It was claimed that the pickets hindered the ingress and egress of the trucks and required them to slow down. After the first day the pickets sat in automobiles on which were displayed like signs, near the entrance to the Postma yard.

"Postma uses bulk cement delivered to him by truck and which is purchased from various companies located in other parts of the State. The cement truck drivers are not Postma's employes; most of them are union members and will not cross a picket line. When the Postma picket line was established, Local No. 406 notified other teamsters' locals with whom the cement haulers had agreements, so they might avoid the expense of returning undelivered bulk cement. Cement is delivered to Postma by five separate trucking concerns. Postma testified that failure to receive bulk cement would paralyze his business. In September several gravel producers in the Grand Rapids area agreed to a wage increase, provided Postma and other competitors would pay the same rate."

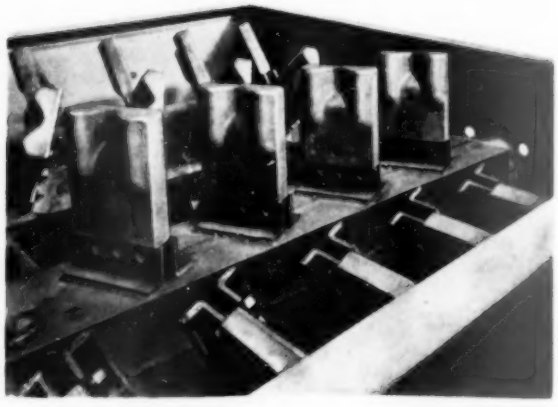
(Continued on page 106)

NI-HARD* CASTINGS

ARE PUT TO THE SUPREME TEST IN EAGLE LOG WASHERS



AND THEY COME THROUGH WITH LOWERED MAINTENANCE COSTS!



The only difference between washing gravel and holding metal to a grinding wheel is that the grinding wheel is more gentle. The paddles on a log washer take a terrific beating . . . abrading and churning through gravel, crushed stone and metallic ores, ton upon ton, day after day. To be commercially practical the metal used for these paddle shoes must withstand abusive wear and be reasonably priced. Ni-Hard—nickel alloyed cast iron—has met the challenge. It greatly outlasts semi-steel, chilled iron and other metals tried. Readily replaceable.

Ni-Hard shoes, shown above, are bolted to blades on the revolving "log" or shafts of the Eagle Log Washer. The scouring action of the paddles plus wash water currents rising from the tub bottom provide positive removal of tough plastic clay balls, conglomerate and soft stone.

Eagle Iron Works modern, closely controlled foundry is licensed to produce Ni-Hard castings for use on Eagle equipment and for others requiring Ni-Hard castings.

* Reg. U. S. Pat. Off.

EAGLE IRON WORKS

137 Holcomb Ave., Des Moines, Iowa

Screw Washers | Log Washers | "Swintek" Dredge Ladders | Clay Crushers | Clay and Cinder Grinders | Shale Planers | Coal Crackers

PEOPLE in the news

Represents N.C.M.A.

THEODORE LEBA, former chief structural engineer of the U.S. Coast Guard, has been appointed Washington representative of the National Concrete Masonry Association, Chicago, Ill. Mr. Leba graduated from Newark College of Engineering, Newark, N.J., in 1935 with a B.S. degree in civil engineering, after which he obtained his M.S. degree in civil engineering at New York University. He also studied engineering and structural design at Columbia University and Purdue University, and public speaking at George Washington University, Washington, D.C. Mr. Leba since 1949, has served in the capacity of chief structural engineer for the U.S. Coast Guard in Washington, D.C. During this time he also conducted a private practice as structural design engineer on a part-time basis. Prior to that he was structural design engineer for the Bureau of Plant Industries, Beltsville Research Center, Beltsville, Md. Previously he was structural engineer for the Veterans Administration, Construction Service. Mr. Leba also served in active military service with the Corps of Engineers on construction of Alaskan bases and on the staff of the Alaska Defense Command as assistant engineer to the engineer's office.

Theodore Leba

Heads Maule Industries

J. H. BUCHANAN, former Miami, Okla., industrialist and banker, was elected president of Maule Industries, Inc., Miami Beach, Fla., at a recent meeting of the board of directors. He succeeds C. B. McDonald, who has retired but remains as a director. M. F. Pafford was named executive vice-president and treasurer; F. K. Foster and F. Paul Anderson, vice-presidents; A. W. Wallace, secretary; J. Lee Telford, assistant secretary; Don Kelly, assistant treasurer; and R. C. Faber, assistant vice-president.

Other appointments include: E. B. Streat, general superintendent; S. C. Allen, chief engineer; Monses Lewis, manager of the Ojus and Broward division; V. P. Bornet, engineer in charge of steel; F. C. Bamman, manager of the precast concrete department, and Charles E. Quentel, manager of the lumber and millwork department.

Control of Maule Industries, Inc., is reported to have changed hands about six months ago with the purchase of a majority of its stock for a permanent investment by the Chemical Research Corp. of Delaware.

Marquette Promotions

ALVIN W. HICKS, sales manager in the St. Louis office of Marquette Cement Manufacturing Co., Chicago, Ill., has been promoted to assistant director of sales for the company and its subsidiaries. M. N. Quint, who has been assistant to Mr. Hicks for the past five years, has been appointed sales manager for the Missouri-southern Illinois area of the St. Louis office. Mr. Hicks is a concrete specialist of wide experience. He received his engineering training at the University of Texas, and was associated with the engineering divisions of the Missouri Pacific Railroad, Arkansas State Highway Department, and the U.S. Corps of Engineers prior to joining Marquette in 1944. Mr. Hicks is a member of the American Concrete Institute and the American Society of Civil Engineers.

Alvin W. Hicks

M. N. Quint

Sales Manager

A. P. STONE, district manager in the Richmond, Va., office of Lehigh Portland Cement Co., Allentown, Penn., has been appointed southern sales manager with headquarters in Allentown. His territory includes Richmond, Jacksonville and Birmingham. G. B. Fawley, who has been connected with the Richmond sales force for several years, succeeds Mr. Stone as district manager.

On Quality Control Staff

WARREN O. CAMPBELL has been appointed a member of the quality control staff at the Parsons, Kan., plant of National Gypsum Co., Buffalo, N.Y. He was formerly social welfare director of Montgomery county in Kansas.

Manager Resigns

C. E. BAXTER, JR., has resigned as manager of Batesville White Lime Co., Batesville, Ark., and its subsidiaries at Love Hollow and Myersville, and has temporarily assumed a position in the management of a new lime plant in Cleburne, Texas. Cecil Lynch, a member of the board of directors, has temporarily taken over the management of the Batesville enterprises.

In Charge of Production

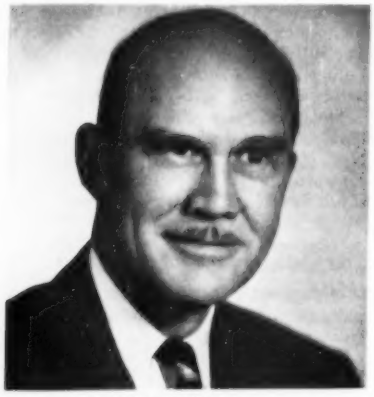
ROBERT E. SCIFRES, formerly superintendent of the National City, Mich., plant of National Gypsum Co., Buffalo, N.Y., has been promoted to assistant production manager, gypsum division, and will be in charge of production at the gypsum plants in National City, Mich., Fort Dodge, Iowa, Medicine Lodge, Kan., and Rotan, Texas. He will make his headquarters in Buffalo, N.Y. Born and educated in Indiana, Mr. Scifres graduated from Purdue University and received his Master's degree from Massachusetts Institute of Technology.

C. of C. Committee Members

THE CHAMBER OF COMMERCE of the United States has appointed a 34-man Construction and Civic Development Committee for 1952-1953. Included in the committee are Carl D. Franks, executive vice-president, Portland Cement Association, Chicago, Ill.; Carl B. Jansen, president, Dravo Corp., Pittsburgh, Penn.; Frank E. McCaslin, president, Oregon Portland Cement Co., Portland, Ore., who is also a director; L. S. Meyer, president, Hydraulic Press Brick Co., St. Louis, Mo.; and Robert F. Porter, vice-president, Harry T. Campbell Sons' Corp., Towson, Md.

P.C.A. Appointments

MILES D. CATTON, director of development of the Portland Cement Association since 1949, has been appointed assistant to the vice-president



Miles D. Catton

for research and development, Dr. A. Allan Bates. He succeeds H. F. Gonnerman, who has retired after 30 years of active service with the association. Douglas McHenry, who recently joined the association as administrative assistant to Dr. Bates, succeeds Mr. Catton as director of development.

Mr. Catton is best known for his many scientific papers and technical brochures on soil-cement construction and for his pioneering work in this field. From 1935 to 1940 he directed laboratory and field studies on scientific control of mixtures of native soil and portland cement which were

Douglas McHenry

largely responsible for the development of this low-cost paving material.

Mr. McHenry, prior to joining the association, served with the U.S. Bureau of Reclamation in Denver, where he was head of the structural development section and later chief of the concrete laboratory section. In 1943 he received the Sanford E. Thompson Award of the A.S.T.M., and in 1944 the Telford Award of the Institution of Civil Engineers of Great Britain.

On Safety Committee

JOHN JARDINE, president of Concrete Sectional Culvert Co., Fargo, N.D., has been appointed a member of the industrial safety committee of the Fargo Chamber of Commerce.

Elected Vice-Presidents

RICHARD I. YOUNG has been elected vice-president in charge of sales of United Concrete Pipe Corp., Baldwin Park, Calif., and Alvin O. Wiese has been named vice-president of finance.

Manages Concrete Plant

RAY A. BROWNING, Ashland, Va., has been appointed plant manager of the Capitol Concrete Products Co., Topeka, Kan.

Assistant Manager

CURTIS JERNIGAN, formerly assistant director of research at the Hudson, N.Y., laboratory of Lone Star Cement Corp., New York, N.Y., has been appointed assistant manager of "Incor" and technical service in the New York office. Mr. Jernigan joined the company in 1935, after graduation from College of William and Mary, serving as assistant chemist in the laboratory at the Norfolk, Va., plant.

Sales Manager

BLAINE E. MILLER has been appointed sales manager of the Toledo, Ohio, district of the Huron Portland Cement Co., Detroit, Mich. Mr. Miller, who has been with the company for 14 years, was formerly a salesman in the Toledo office.

O.P.S. Chief Resigns

WALTER A. ACHESON, chief of the Building Materials Branch of the Office of Price Stabilization, has resigned to return to private industry with his former company, Somers-Barr Co., Champaign, Ill., as general manager. Mr. Acheson appeared on the program of the National Lime Association's 50th Convention at Hot Springs, Va., last May. Irving Rubenstine, formerly an economist in the Building Materials Branch, has succeeded Mr. Acheson as chief of the branch.

Association President

GEORGE W. HANDY, manager of acoustical sales for National Gypsum Co., Buffalo, N.Y., has been elected president of the Acoustical Materials Association.

Elected Director

WASHINGTON DODGE, a partner in the New York Stock Exchange firm of Roberts & Co., has been elected a director of the Colonial Sand and Stone Co., Inc., New York, N.Y.

Assistant to President

FRANK R. CADMAN has been appointed assistant to John Curtin, Jr., president of Warner Co., Philadelphia, Penn., in addition to his duties as industrial relations manager. Born in Philadelphia, Mr. Cadman graduated from Wesleyan University, Middletown, Conn. He joined the company in 1941 as assistant industrial relations manager and two years later he was named industrial relations manager in charge of employe communications, safety, personnel problems and labor relations. Prior to that he was connected with the Seattle Gas Co. He has been active in various associations, serving as president of the Industrial Relations Association, Philadelphia Chapter of Safety Engineers, and as chairman of the Industrial Relations Committee of the Philadelphia Chamber of Commerce, of which he is still a member. He is also at present serving on the Industrial Relations Committee of the Pennsylvania State Chamber of Commerce and is chairman of the Workmen's Compensation Committee of the Philadelphia Chamber of Commerce. Mr. Cadman is also currently serving as a member of the National Labor-Management Committee for Defense Manpower for the Third Region, which covers Pennsylvania and Delaware.

Manager of Slag Sales

R. KENNETH PLUMB has been appointed manager of slag sales for United States Steel Co., Pittsburgh, Penn. Formerly manager of slag sales in the American Steel and Wire division, he succeeds Erle L. Flad, who has retired after 43 years of service with U.S. Steel. Mr. Plumb is a native of Parkersburg, W. Va. He attended Culver Military Academy and completed a business executive course at Fort Sheridan, Ill., before joining United States Steel in Pittsburgh in 1917 as a salesman for the Universal Atlas Cement Co. After two years of military service during World War I, he returned to Universal Atlas in 1920. Ten years later he became a salesman in the slag sales department of Carnegie Steel Co. and in 1938 was made Cleveland district representative in the slag sales division of Carnegie-Illinois Steel Corp. Mr. Plumb was appointed manager of slag sales for American Steel and Wire Co. in Cleveland in 1946 and

R. Kenneth Plumb

retained that position when the company became a division of U.S. Steel.

Mr. Flad was born in Easton, Penn., and graduated from Lafayette College with a degree in mining engineering. He joined U.S. Steel in 1909 in the blast furnace department of the Youngstown district works of Carnegie Steel Co. He subsequently became assistant superintendent of blast furnaces and then slag salesman. In 1919 he was made superintendent of slag sales in the Youngstown district. In 1930 he transferred to Pittsburgh as assistant manager of the sales bureau, and in 1933 he was made manager of slag sales.

Sales Engineer

JOSEPH N. MCGOWAN of Bordentown, N.J., has been appointed sales engineer for the Kingston Trap Rock Co., Kingston, N.J., and Hervey S. Moore, Jr., has joined the staff as a full-time attorney. Mr. McGowan has been assigned as sales engineer for the Pennington Quarry Co., new central mix concrete plant.

Heads C. of C. Section

FRANK E. MCCASLIN, president, Oregon Portland Cement Co., Portland, Ore., and a member of the board of directors of the U.S. Chamber of Commerce, has been named chairman of the United States section of the Northwest Development Committee, maintained jointly by the Canadian and United States Chambers of Commerce. The Northwest Development Committee meets twice each year, once in each country, to consider the problems of mutual interest to the two countries in developing the natural and economic resources of the northwestern states, the western Canadian provinces and Alaska.

Directs Pageant

PHILIP E. HEIM, vice-president in charge of sales for Carbon Limestone Co., Youngstown, Ohio, was master of ceremonies for a recent 4-H Club pageant at Geauga County Fair. Mr. Heim is a former 4-H Club member.

OBITUARIES

WILLIAM J. MONTZ, retired superintendent of the Ormrod, Penn., plant of the Lehigh Portland Cement Co., Allentown, Penn., died September 3 after a short illness. He was 78 years old. Mr. Montz had been associated with the company for more than 50 years, starting in the shops and working his way up to plant superintendent. He retired about five years ago.

J. W. SPARKMAN, owner of the Sparkman Gravel Co., Dallas, Texas, died September 11 at the age of 44. Born in Lancaster, Texas, in October, 1907, Mr. Sparkman had been a resident of Dallas for 25 years.

CARL LEVIN HERNER, retired concrete block manufacturer of Waukegan, Ill., died recently after an illness of two years. He was 80 years old and had been a resident of Waukegan for 52 years.

ARNOLD L. HART, Ocala, Fla., a member of the board of directors of the Loncala Phosphate Co., Clark, Fla., died September 25 after a long illness. He had recently returned home from a six weeks' visit in England, where he was born.

FILMORE A. RIPPLE, vice-president, general manager and superintendent of the Mulvane Sand Co., Mulvane, Kan., died September 21 after a long illness. He was 56 years old. Born in Appleton, Wis., Mr. Ripple went to Mulvane with his parents in 1909. He was associated with the Webb City and Joplin Sand Co. for 26 years and in 1949 formed Mulvane Sand Co.

ARTHUR J. LITTLE, works manager of the Bay Bridge, Ohio, plant of Medusa Portland Cement Co., Cleveland, Ohio, died suddenly on October 5 at his home in Sandusky, Ohio. He was 55 years of age. A native of York, Penn., Mr. Little went to Sandusky to accept a position with the Sandusky Cement Works. In 1914 his services were loaned to the Pearson Engineering Corp. which was engaged in constructing the Laide Dam near Barcelona, Spain. Upon his return to the United States, Mr. Little took an engineering course at Purdue University. From 1917 to 1919 he served in World War I as a field artillery officer. In 1919, after leaving the armed services, he returned to the Sandusky Cement Works, now the Medusa Portland Cement Co., as superintendent.

FREDERICK E. HALL, SR., president of the T. J. Hall Sand and Gravel Co., Cincinnati, Ohio, before it was disbanded in 1944, the year he retired from business life, died August 23 in Fort Thomas, Ky., after a long illness. He was 69 years old. A native of Aberdeen, Ohio, Mr. Hall graduated from Newport High School and attended Kenyon College, Gambier, Ohio. He was an active member of the Ohio Sand and Gravel Association and the National Sand and Gravel Association.

HENRY HORN, president of Cinder Block, Inc., Detroit, Mich., died September 7 at his summer home. Mr. Horn was an active member of the National Concrete Masonry Association and had long been recognized as a leader in the concrete masonry industry.

NATCHER ROSS FRANCE, vice-president in charge of operations of the France Stone Co., Toledo, Ohio, died October 7 after an illness of several weeks. He was 42 years old. Mr. France joined the company in 1928 and served in various managerial positions. Four years later he was named general superintendent of the Gibsonburg and Springfield, Ohio, plants. In 1943, Mr. France was appointed vice-president in charge of operations. His grandfather, for whom he was named, founded the France Stone Co., and his father, George A. France, now is president of the company.

PAUL M. WAGNER, president and treasurer of the Lexington Sand and Gravel Co., Lexington, Mass., passed away at his home in Woburn, Mass., on September 7. He was 75 years of age. Born in Reading, Penn., Mr. Wagner graduated from Girard College in 1895, when he became associated with the J. B. Cresson Co., Philadelphia, Penn. In 1915 he became a partner in the New England Sand and Gravel Co., West Peabody, Mass. In 1922, Mr. Wagner founded the Lexington Sand and Gravel Co. and since that time had been a prominent figure in the industry.

ENGINES DO MORE WORK

...COSTS COME DOWN

..when you lubricate with TEXACO URSA OIL X**

Don't let excessive engine repairs and overhauls delay work and cut into profits. Lubricate with *Texaco Ursa Oil X***. Depend on it to keep engines out of the shop and on the job. And you'll save not only on maintenance costs but on fuel consumption, too.

*Texaco Ursa Oil X*** is fully detergent and dispersive, with high resistance to oxidation. It keeps both heavy duty gasoline and Diesel engines clean . . . rings free, valves active. Keeps harmful deposits from forming, stands up in severe service, protects against wear and corrosion. With *Texaco Ursa Oil X*** you can count on longer parts life . . . better all-around performance.

For chassis lubrication, use *Texaco Marfak*. The best evidence that it gives longer lasting protection, reduces maintenance costs, is this fact: *More than 400 million pounds of Texaco Marfak have been sold!*

For wheel bearings, use *Texaco Marfak Heavy Duty*. It seals out dirt and moisture, seals itself in. Won't leak onto brakes. No seasonal change required.

For crawler track mechanisms, use *Texaco Track Roll Lubricant*. It guards against dirt and moisture, wear and rust for long periods; assures longer parts life.

Follow the Texaco simplified lubrication plan

With the Texaco Simplified Lubrication Plan, all your major lubrication can be handled *with only six Texaco Lubricants!* Here's true simplicity, greater economy. A Texaco Lubrication Engineer will gladly give you full details. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York, 17, N. Y.

TEXACO Lubricants and Fuels

Faithfully yours 50 *for Fifty Years*

TUNE IN: Tuesday nights on television—the TEXACO STAR THEATER starring MILTON BERLE. See newspaper for time and station.

industry news

World's Largest Crusher

WHAT IS CLAIMED TO BE the world's largest primary gyratory crusher, approximately 27 ft. high with a diameter close to 19 ft. and weighing

Shown above is world's largest primary gyratory crusher. On inspection stand are: right, from bottom up, W. J. Coulter, vice-president; M. Dessau, mill superintendent; and C. J. Abrams, manager, all of Climax Molybdenum Co. Left, bottom on up, are H. M. Zoerb, administrative manager, Nordberg Mfg. Co.; A. Stazicker, purchasing agent, Climax Molybdenum Co.; and R. R. Shafter, vice-president, Nordberg Mfg. Co. In foreground is a crankshaft for a 10,800-hp., 29-in. bore, 40-in. stroke, 12-cylinder diesel engine

well over 500 tons, has been installed at Climax Molybdenum Co.'s Storke Level, Colo., plant to crush molybdenum ore.

This crusher (Symons) has a 60-in. feed opening and was built by Nordberg Manufacturing Co. at its Milwaukee, Wis., plant. It required 12 railroad cars to ship the crusher and, because of the large size and weight, special heavy-duty cars with capacities up to 100 tons each were used.

N.A.L.I. News Service

NATIONAL AGRICULTURAL LIMESTONE INSTITUTE has for some time carried on a news service for its membership as a part of its promotional program. Four news releases a month have been going to daily and weekly newspapers, farm magazines and radio stations. This service has been available to members at no cost. However, due to the greatly increasing number of requests for this service, N.A.L.I. has announced that it has found it necessary to make a slight charge for this service. It was voted that beginning January 1, 1953, a charge of $2 per unit (newspaper, radio station, TV station, etc.) will be made. This means that, for the $2 fee, each newspaper or other unit will receive four news releases a month, or 48 per year. The national farm magazines and national news services will continue to be supplied by the association.

To determine the value of this news service to the members, N.A.L.I. sent a questionnaire to its membership. Of those replying, over half reported that they were using these releases regularly and many more said they found them helpful in preparing their own material.

Overloaded Trucks

THE PUBLIC UTILITIES COMMISSION, Columbus, Ohio, has issued an administrative "trip-lease" order, effective November 1, 1952, which is designed to halt truck overloading in the state. The order bans haulage charges on a tonnage or percentage-of-revenue basis. Written contracts will be required, thereby placing responsibility on the proper person or firm for any violations. The authorized carrier was given control over the driver for the first time. The order prohibits sub-leasing of trucks, or leasing of equipment to non-carriers.

The new regulation also requires truck-owners to carry liability insurance. The commission ruled that haulage charges in the future must be made on a flat rate, by mileage, or on a time basis.

A.E.C. Patents

THE ATOMIC ENERGY COMMISSION recently announced that descriptions of 26 patents, owned by the U.S. government and held by the A.E.C., have been transmitted to the U.S. Patent Office for registry and listing in the official register of patents. The A.E.C. will grant non-exclusive, royalty-free licenses on the listed patents as part of its program to make non-secret technological information available for use by industry. Some of these patents may be of potential value to the rock products industries. A list of the patents, giving number, title, inventor and a brief abstract, may be obtained from the U.S. Patent Office. Commission-held patents and patent applications released for licensing now total 485.

Places Kiln in Operation

CALAVERAS CEMENT CO. recently announced that its new fourth kiln, which has been in process of installation for the past several months, has

New kiln at Calaveras Cement Co.'s San Andreas plant was recently placed in operation

now been placed in operation at the company's San Andreas, Calif., plant, marking completion of the $2,500,000 expansion and modernization program launched a year ago.

The new kiln, which will increase plant capacity by 50 percent, is 11 ft. 3 in. x 360 ft. and is a duplicate of the company's third kiln installed at the plant in 1946.

Equipment installed in connection with the kiln includes raw grinding mills, a $250,000 dust collector, a cooler, quarry equipment and blending and storage silos. Installation of the new equipment was under the supervision of A. A. Hoffman, vice-president and consulting engineer of Calaveras Cement Co.

H. C. "Pat" Maginn, executive vice-president and chairman of the Management Committee, expressed hope that the additional production will help prevent future cement shortages such as those which occurred in northern California during 1950 and 1951. Calaveras Cement Co. manufactures gray, white and plastic cements.

Cover Picture

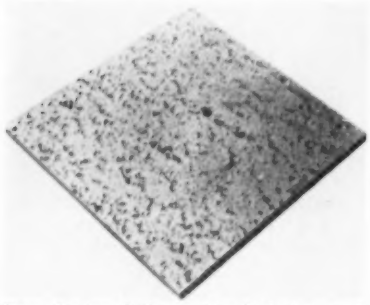
THE NATIVIDAD, California plant of Kaiser Aluminum & Chemical Corp. is the first limestone operation in the country to employ the heavy-media separation process for beneficiation of stone to be calcined. The process used here reduces the silica content so that dolomitic lime produced is guaranteed to contain less than 1 percent silica.

For more information on the plant and the process see page 82.

Acoustical Tile

THE CELOTEX CORP., Chicago, Ill., recently announced a new, incombustible, acoustical product called Celotone tile. Molded from mineral fibers (basically rockwool, processed from limestone) and special binders, the new tile has deep, irregularly shaped and spaced fissures that provide a texture similar to that of travertine marble.

The tile is claimed to provide a high degree of sound absorption. In



Fissured mineral tile provides high degree of sound absorption

the $\frac{11}{16}$-in. thickness, the noise reduction coefficient is 0.70, according to tests conducted by the Acoustical Materials Association's Riverbank Laboratories.

Celotone tile is manufactured in thicknesses of $\frac{11}{16}$, $\frac{13}{16}$ and $\frac{15}{16}$ in., and in 12- x 12- and 12- x 24-in. sizes, with square or bevelled edges. It has a washable white finish and a light-reflection factor of 0.80. The tile is distributed in the United States and Canada through franchised distributors of Acousti-Celotex products.

New York Producers Meet

THE EMPIRE STATE Sand, Gravel and Ready Mix Association held its directors and western New York area meeting at the General Brock Hotel, Niagara Falls, Ont., on August 27, 1952. Vincent P. Ahearn, executive secretary of the National Sand and Gravel and National Ready Mixed Concrete Associations, was the guest speaker.

Several special activities are being considered by the association for the coming year, among them being a "Short Course School" which would be held during the time of the January meeting. Dr. S. C. Hollister, dean of engineering, Cornell University, has expressed interest in making the facilities of the engineering department available to the association for such a session. Subjects to be presented and discussed will be determined by a program committee of the association, with Dr. Hollister serving as consultant.

Another project of the association will be to serve as a clearing house for those interested in the purchase or sale of used equipment. Members have been requested to notify the association of used items they wish to sell or purchase. This information will be tabulated and sent to all members, both active and associate, giving names and addresses so that direct contact may be made.

Portland Cement Production

THE PORTLAND CEMENT industry produced 23,573,000 bbl. of finished cement in August, 1952, as reported to the Bureau of Mines. This was an increase of 5 percent compared with the output in August, 1951. Mill shipments totaled 25,915,000 bbl., a decrease of 0.3 percent from the August, 1951, figure, while stocks were 12 percent above the total for the same month in 1951. Clinker production during August, 1952, amounted to 22,233,000 bbl., an increase of 1 percent compared with the corresponding month of the previous year. The output of finished cement during August, 1952, came from 155 plants located in 37 states and in Puerto Rico. During the same month of 1951, 22,514,000 bbl. were produced in 151 plants.

D.P.A. Approves Expansion

GENERAL PORTLAND CEMENT Co., Chicago, Ill., has geen granted approval by the Defense Production Administration for construction of cement storage facilities at Tampa, Fla. Cost of the project was listed at $685,000.

Coming Conventions

November 20-22, 1952—
American Concrete Pipe Association, 2nd Annual Short Course, Sherman Hotel, Chicago, Ill.

November 22-26, 1952—
National Concrete Masonry Association, Southeastern Regional Meeting, Casablanca Hotel, Miami Beach, Fla.

December 9-10, 1952—
Missouri Limestone Producers Association, 8th Annual Convention, Hotel Governor, Jefferson City, Mo.

January 14-15, 1953—
Wisconsin Concrete Products Association, 33rd Annual Convention, Plankinton House, Milwaukee, Wis.

January 18-21, 1953—
National Agricultural Limestone Institute, 2nd Annual Convention, Hotel Statler, Washington, D.C.

January 26-29, 1953—
National Concrete Masonry Association, 33rd Annual Meeting and Concrete Industries Exposition, Cleveland Public Auditorium, Cleveland, Ohio.

February 2-3, 1953—
National Concrete Products Association (Canada), 4th Annual Convention, King Edward Hotel, Toronto, Ont., Canada

February 2-6, 1953—
National Crushed Stone Association, 36th Annual Convention, Hotel New Yorker, N.Y., N.Y.

February 9-11, 1953—
American Road Builders' Association, Annual Meeting, Hotel Statler, Boston, Mass.

February 23-26, 1953—
National Sand and Gravel Association, 37th Annual Convention, Fairmont Hotel, San Francisco, Calif.

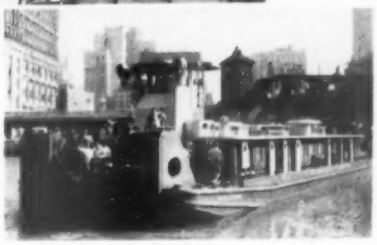
National Ready Mixed Concrete Association, 23rd Annual Convention, Fairmont Hotel, San Francisco, Calif.

February 25, 1953—
American Concrete Pressure Pipe Association, 4th Annual Convention, Baker Hotel, Dallas, Texas.

February 26, 1953—
American Concrete Agricultural Pipe Association, 3rd Annual Convention, Baker Hotel, Dallas, Texas.

February 26-28, 1953—
American Concrete Pipe Association, 45th Annual Convention, Baker Hotel, Dallas, Texas.

March 4-5, 1953—
Iowa Agricultural Limestone Association, 8th Annual Convention, Savery Hotel, Des Moines, Iowa.



Attending christening of Material Service Corp.'s new 103-ft. diesel towboat (right) were, left to right above, Mrs. Henry Crown, Mayor Martin H. Kennelly of Chicago, Col. Henry Crown, Arnold Sobel, Mrs. Arnold Sobel, Mrs. Lester Crown, Robert Crown and Lester Crown

Material Service Launches New Towboat

MATERIAL SERVICE CORP., Chicago, Ill., large producer of concrete aggregates, crushed stone and lime, recently launched its new 103-ft. diesel towboat (see ROCK PRODUCTS, May, 1952, issue, p. 63). Col. Henry Crown, chairman, christened the new motor vessel the "Irving Crown" in honor of the company's executive vice-president who is in charge of all company operations. The christening took place at the Merchandise Mart dock, Chicago, Ill., August 28, in the presence of Mayor Kennelly and guests from the Coast Guard and the Corps of Engineers. Col. Crown served with the Corps of Engineers in World War II and his marine chief, Arnold Sobel, was a PT boat commander.

The "Irving Crown" joins Material Service Corp.'s fleet of five towboats and 100 barges which operate daily in Chicagoland waters among the corporation's 27 yards and docks. Built by Sturgeon Bay Shipbuilding & Dry Dock Co., Sturgeon Bay, Wis., at a cost of approximately $500,000, the new vessel has a hydraulic elevating and retractable pilot house which permits easy bridge clearance. Powered by two twin-screw, 1600-hp. Nordberg Supairthernal engines, it is capable of pushing eight barges loaded with 11,000 tons of construction materials. The vessel features two independently connected hydraulic steering gears, one for the four flanking rudders and the other for the two steering rudders. For maximum safety, the engine compartment is subdivided into main and auxiliary engine rooms, connected by a watertight door. Its all-electric welded steel hull is of heavy-duty construction. The plating on the bow has been increased from a normal ⅜ in. to ½ in., for service in icy waters.

Following is some of the vessel's major equipment:

Air compressors, Gardner-Denver vertical air compressor.
Motor generators, Marble-Card, Gladstone, Mich.
Filter feed pump, Fairbanks, Morse & Co., Chicago, Ill.
Heating boiler, Kewanee Boiler Corp., Kewanee, Ill.
Pilot house lift, Rotary Lift Co., Chicago, Ill.
Fire pump, Aurora Pump Co., Aurora, Ill.
Main engine L. O. scavenging pumps, DeLaval Steam Turbine Co., Trenton, N.J.
Main engine L. O. pressure pumps, DeLaval Steam Turbine Co., Trenton, N.J.
Main engine L. O. pump motors, Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Jacket water pumps, Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Main engines, Nordberg Mfg. Co., Milwaukee, Wis.
Heat exchanger, Ross Heater & Mfg. Co., Inc., Buffalo, N.Y.
Turbochargers, Elliot Co., Jeanette, Penn.
Generators (engine), General Motors, Detroit, Mich.
Generator, General Motors, Detroit, Mich.

Metal Casting Process

POWDERED METAL PRODUCTS CORP. OF AMERICA, Franklin Park, Ill., has started production of precision castings made by the new shell molding process. The process was invented by a German and has been declared public property by United States Government agencies.

Shell molding is said to turn out precision castings at or near the cost of ordinary sand castings. The "shell" is made of a mixture of sand and plastic applied to a die and then baked in an oven to acquire strength before hot metal is poured into it. Precision castings have been turned out by a number of other processes, but the new shell mold generally is less expensive to use. The mold is used only once and thus can be destroyed in removing the casting.

New Potash Plant

AMERICAN POTASH & CHEMICAL CORP., Los Angeles, Calif., plans to build an $850,000 potash dewatering and drying plant to replace its present facilities at Trona, Calif., it was recently announced by A. J. Anderson, Trona plant manager. The new plant is expected to be in operation by the middle of 1953. The construction contract for the project has been awarded to Stearns-Roger Co., Denver, Colo. Among the new equipment will be two 15-ft. dia. horizontal Oliver filters and two large-capacity dryers, replacing 16 hand-operated centrifuges and four small dryers.

Uranium Minerals

THE DEPARTMENT OF INTERIOR recently announced the release of the revised edition of a glossary of uranium and thorium bearing minerals. The glossary, intended as a guide to the nomenclature of these minerals, was prepared as a part of the work on radioactive minerals by the Geological Survey on behalf of the Atomic Energy Commission.

The glossary, written by Judith Weiss Frondel, mineralogist, and Michael Fleischer, geochemist, contains a list of minerals and their chemical formulas, together with information as to series relationships collected from laboratory work and scientific literature.

This second edition contains 350 entries, comprising 182 species. Copies may be obtained without charge from the Director, Geological Survey, Washington 25, D.C.

Expansion Completed

CAROLINA GIANT CEMENT CO. recently completed expansion of its Harleyville, S.C., plant, at a cost of approximately $5,000,000. The plant, built four years ago with an annual capacity of 800,000 bbl., is now in full production at the rate of 2,000,000 bbl. annually. The company is also building a modern concrete office building in Columbia, S.C., and is doubling its office and sales force there.

The Harleyville plant was originally built by the government as a wartime operation for the extraction of alumina from native clays. In 1947 it was purchased by Carolina Giant Cement Co. as surplus property.

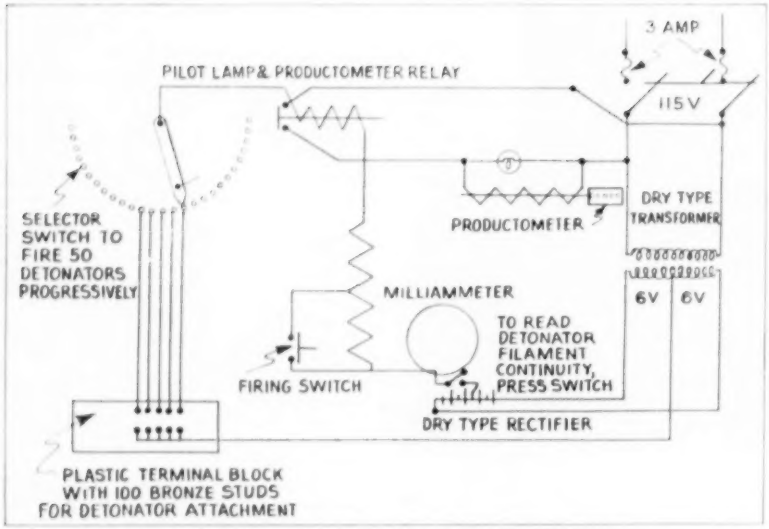
Pavement Yardage

AWARDS OF CONCRETE PAVEMENT for the month of September and for the first nine months of 1952 are listed by the Portland Cement Association as follows:

	Sq. yd. awarded	
	During September 1952	During first nine months 1952
Roads	1,051,206	21,565,139
Streets and alleys	2,794,794	21,108,902
Airports	1,690,507	7,288,000
Totals	5,536,507	49,962,041

HINTS and HELPS

PROFIT-MAKING IDEAS DEVELOPED BY OPERATING MEN



Set-up for selective firing test, used with galvanometer check

Detonator Testing Device

By PAUL C. ZIEMKE

HANDBOOKS ON EXPLOSIVES stress the importance of checking the dependability of electrical firing devices to prevent any mishap once the switch is thrown. Some operators check the firing devices against a galvanometer as they are removed from the carton, and then a second time as they are made up into "exploders," and finally as the blast hole is connected to the shot network as a whole. This method is considered practical and satisfactory under mild weather conditions but has definite limitations in cold climates. Because of the limitations of the galvanometer in making accurate checks, the author has prepared the accompanying diagram to give a more dependable insight into the quality of the detonator stock. A mere deflection of a needle is hardly a sure sign that that detonator will fire in a vital hole. The diagram illustrates how the galvanometer check can be combined with the more realistic approach of firing under simulated field conditions.

Under this set-up, 115 a-c voltage was stepped down to 6 volts for rectification and use in the meter, relay, "productometer" and firing circuits. One detonator out of each carton is segregated for the firing test, which develops a total of 50 detonators through a selective switch common to old-time, battery-powered radios. There can be little question about the condition of the electrically-fired devices when both galvanometer and selective fire testing is done meticulously by dependable employes.

Reducing Segregation

AT A WESTERN gravel operation, segregation has been substantially reduced by the installation of a reciprocating chute on the outboard end of one of the stacker belts. The chute operates in the manner of a pendulum, swinging slowly back and forth. The reciprocating mechanism consists of a mounted "jack" from a well pump, driven by a short roller chain drive from the tail pulley of the stacker. All stacker belts are driven from the tail end in order to save weight. For the same reason, 18-in. conveyor belts ride on 16-in. carrier rolls with reportedly good results.

Reciprocating chute at end of stacker

Underwater Dynamiting Operations

AT A SOUTHERN rock products operation where excavating operations are carried out 30 ft. under water, it is not practical to drill by conventional methods. Cut lengths of plastic tubing are used as spacers in the company's dynamiting operations. These

Plastic tubes used as spacers in underwater dynamiting operations

spacers, which are supplied by Irvington Varnish and Insulator Co., are inserted intermittently with dynamite sticks into a plugged-end pipe which is driven into the rock by pile-driver action.

Prior to loading with the dynamite and spacers, the plug is knocked out of the end of the pipe, permitting the water pressure to equalize. After loading, the pipe is withdrawn and a cap is placed in a stick near the top and the charge is then detonated. Reportedly, there has been no difficulty experienced in the propagation of the dynamite right to the bottom of the hole. Use of the plastic spacers is said to have reduced the company's dynamite consumption by 30 percent while still retaining effective breaking.

Keeping Compressed Air Lines Tight

COMPRESSED AIR, as indicated by its increased use, is becoming one of the foremost power transfer means. Maximum benefits are being obtained by those who keep close vigilance over their air systems, but when adequate maintenance is not conducted, there

may be considerable loss in production and dollars.

One of the greatest production robbers is low pressure. It has been found that if the pressure at a pneumatic tool falls from 90 to 70 p.s.i.g., production output of that tool may drop as much as 35 percent. Because compressed air systems in most plants utilize pressure between 90 and 110 p.s.i.g., air motors are designed to operate within those working pressures. However, an air motor built to operate at 90 p.s.i.g. will lose 25 percent of its capacity if line losses, in delivering air, drop the pressure to 70 p.s.i.g. The illustration shows a hypodermic needle-gauge device, developed for detecting any variation in air pressure. The needle gauge indicates the pressure received by the tool (the hole made by the needle is self-closing). Low pressure means lost production.

One of the principal causes of low air pressure is leakage in the distribution system, usually occurring around valve stems, hose connections, unions, drains and lines leading to inoperative tools. Plant maintenance departments have devised many simple and unique ways to check for leakage. Most frequently used are the lighted candle, or a soapy-water solution which is brushed around suspected areas. One manufacturer puts essence of peppermint into the air system. Detection of the slightest leak

Hypodermic needle gauge indicates amount of air pressure received by tool

is by odor. Another method involves the use of a small air-activated whistle which, when passed over the lines, emits a siren-like noise at leakage points.

The following table, prepared by Compressed Air and Gas Institute, computes the dollar loss resulting from air line leaks.

Size of opening	Air lost (cu. ft. per month at 100 p.s.i.g., based on nozzle coefficient of 0.65)	Cost of air lost ($0.07 per 1000 cu. ft.)
3/8 in.	6,671,899	$467.03
1/4 in.	2,920,840	204.46
1/8 in.	740,210	51.81
1/16 in.	182,272	12.75
1/32 in.	45,508	3.19

Belt conveyor, from side of bin, feeds hammermill

Double-Duty Bin

THE COMPARTMENT BIN shown at the left of the illustration above is primarily a truck-loading bin at a crushed limestone plant. Over it is a Cedarapids vibrating screen from which limestone is discharged into the bin compartments. Out of the side of this bin, and high enough for proper truck clearance is a short stub belt conveyor that feeds a Dixie hammermill powered by a Caterpillar diesel engine. Finer sizes of limestone, including agstone or mine dust, can be produced as needed from excess material stored in the truck loading bin.

Loading Practice

A SAND AND GRAVEL producer in the South strips with a dragline and casts the overburden back into the worked-out portions of the pit. The gravel is excavated and stockpiled in windrows on a strip of ground from which overburden has been removed. In another operation far distant from this one, the gravel and sand are stored on the rim of unstripped ground. At a third operation, at least 1000 miles from either of these two, gravel is hauled by trucks and stockpiled near the plant. Gravel can often be beneficiated by use of such a storage practice. If a field belt system is used, it permits drier gravel to be handled on the belts. If clay pockets are in the deposit, aeration and partial drying of the clay balls often materially aids in their later disintegration.

The illustration below shows rim-stored gravel being loaded to a portable, skid-mounted field hopper equipped with an apron feeder. The P&H crane is the primary loading machine. The apron feeder insures a uniform flow of material to the belt.

Gravel is loaded to portable, skid-mounted field hopper equipped with apron feeder

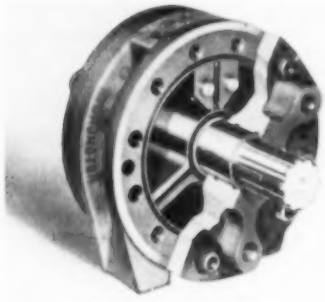
NEW Machinery

Oil Base Coating

L. Sonneborn Sons, Inc., Building Products Div., 80 Eighth Ave., New York 11, N.Y., has developed an exterior oil coating designed for highly porous surfaces. To be used for protecting and decorating exterior stucco, cement, brick, concrete and cinder block, lightweight aggregate block and hollow tile surfaces, it comes in five colors: white, ivory, smoke, concrete, slate and brick red. It is claimed to be effective in sealing and protecting such surfaces, in one application, with a color fast, decorative coating which will not run or sag.

Rotary Actuator

Bonnot Co., Canton 2, Ohio, is now producing "Hydromotors," trade name for reciprocating rotary actuators, as a result of the recent purchase of Hydromotor, Inc. The actuator employs air, oil or other fluid medium and provides equal power in either direction. The manufacturer claims it can be readily controlled as to speed or arc of travel and is self-contained and sealed. The rotary shaft for connection to load is the only external moving element and each size in the line has a dual rating. Single vane units, good for a 280 deg. arc of travel, will supply double the torque values when an extra vane is added and a maximum arc of 100 deg. will serve.



Reciprocating rotary actuator

Oxygen Analyzer

Arnold O. Beckman, Inc., 1020 Mission St., South Pasadena, Calif., has announced an addition to its line of oxygen analyzers. Designed for combustion applications in power plants, steel mills, cement kilns, petroleum refineries and ceramic kilns, the F-3 indicates the oxygen content of flue or process gas automatically. The F-3 measures the magnetic susceptibility of oxygen within 1 percent of full scale for spans of 5 percent and greater. Combustion ranges include 0-5 percent, 0-10 percent, 0-15 percent, and are supplied with a second range of 25 percent. Other ranges of 0-100 percent are available. A positive check of proper operation is made by recording the air-point on the second range.

Oxygen analyzer for combustion control

Any standard potentiometer recorder, controller, or pneumatic receiver can be used with the F-3.

Truck Body and Hoist Line

Converto Manufacturing Co., Third and Green Streets, Cambridge City, Ind., has added a medium-duty line of hoists and bodies to its equipment. This equipment is manufactured for trucks of 1½, 2 and 2½ ton sizes. The bodies have a width of 6½ ft. and are made with 8-gauge steel on the floor.

Aluminum Floor Gratings

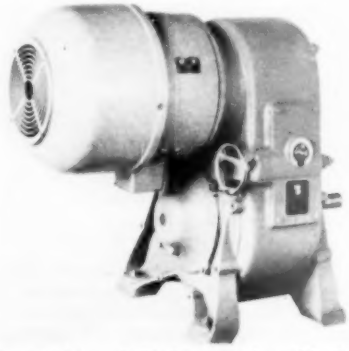
Borden Metal Products Co., P.O. Box 172, Elizabeth, N.J., is producing aluminum floor gratings for use in power plants, sewage plants, water-treatment works, etc. The installation of aluminum floor gratings saves approximately one half the weight of an equivalent steel installation. The lightness of the aluminum alloy permits sections to be removed in case of emergency. With 85 percent open construction in the grating, maximum light and air can circulate. Once installed, the floor gratings need never be painted. Their non-sparking quality reduces fire hazards in confined areas.

Abrasion-Resistant Rubber Coating

Linatex Corp. of America, Rockville, Conn., has made available a special abrasion-resistant form of natural rubber called Linatex. Its principal application is for abrasion- and corrosion-resistant surfacing on such units as sand pumps, chutes, launders, conveyor belts, pulleys, pipe lines, fans, ducts and valves. It is produced in sheet form in thicknesses of $\frac{1}{32}$ to $\frac{1}{2}$ in. A paint is also available. It is claimed to be resistant also to low temperatures and vibration as well as to abrasion and corrosion. It can be attached to articles by a simple cold, air-cured type of cement. Permanent adhesion can be obtained with most surfaces, including metal, wood, concrete, glass fiber and other rubber surfaces, the manufacturer claims.

Power Drives

Sterling Electric Motors, Inc., 5401 Anaheim-Telegraph Road, Los Angeles 22, Calif., has announced that its Speed-Trols, variable speed electric power drives, in the range of 20 to 25 hp. with 2:1, 3:1, 4:1 speed variation are now available in totally enclosed fan-cooled models. Air inside the motor is continuously circulated by the large diameter internal cooling fan through air passages between the motor housing and stator, over the motor windings, and through openings in the rotor. Heat from the motor is dissipated by the triple action of convection, conduction and radiation to the outside of the motor. Much of the heat is carried off by a continuous flow of cooling air forced over the motor housing by the external fan and removable grilled fan cover.



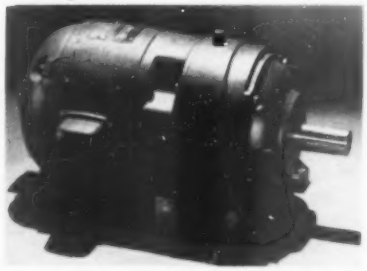
Power drive of 25 hp. capacity with 4:1 speed variation

Hydraulic Torque Converters

THE TORCON CORP., 1199 W. Fifth St., Ashtabula, Ohio, has announced the expansion of its line of hydraulic torque converters to include 11-, 13-, 14-, 15-, 16-, 17-, 18-, 19-, 24-, and 26-in. wheel diameters to meet the needs of a wide range of medium-heavy duty applications. The smallest model can be used with gasoline or diesel engines rated from 30 to 80 hp. and the largest with 150- to 600-hp. engines, with other models covering the intermediate ratings. Each size can be furnished with or without cut-off clutch. They combine a hydraulic torque converter and hydraulic coupling in a single unit. They are specially applicable to diesel and gasoline shovels, lift trucks, cranes and draglines, logging machinery, rail cars, switching locomotives, road machinery, tractors and similar equipment.

Three-Piece Gearmotor

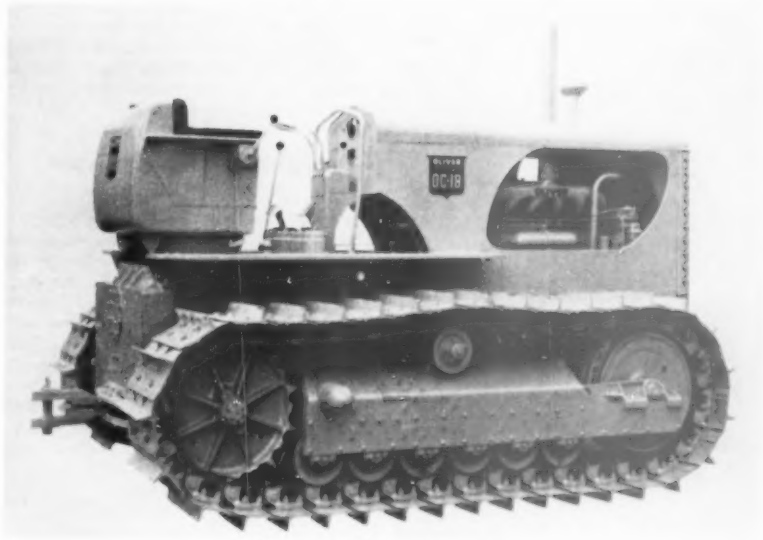
GENERAL ELECTRIC CO. Schenectady 5, N.Y., has announced a new gearmotor, designed to simplify maintenance in case of electrical failure of the stator. The new motor is built in three pieces to permit quick and easy removal of defective stators without disturbing gear components or gear connections to the load. Its design includes a G-E Tri-Clad motor, a compact planetary gear, and a mechanical adapter. The gear is available in speed ratings of 780 to 13.5 r.p.m.



Gearmotor with three-piece construction

The mechanical adapter serves the triple function of acting as the pulley end-shield for the motor, the motor end-shield of the gear housing, and a mechanical spacer for accessibility to the stator frame bolts.

The stator can be changed with the removal of only bearing-enclosure screws, the bolts that hold the front end-shield to the stator, and bolts holding stator to the motor adapter. A defective stator can be replaced by either another round-frame stator or by an ordinary, standard-motor stator with feet. In the new three-piece construction, openings for motor ventilation are provided at the bottom. The new motor is available in ratings of 1 to 75 hp. for standard applications and up to 200 hp. for special applications.



Heavy industrial crawler tractor

Crawler Tractor

THE OLIVER CORP., 400 W. Madison St., Chicago 6, Ill., has announced the "OC-18" crawler tractor. The tractor features pneumatic steering and an over-center clutch which runs across the whole width of the dashboard. Other features include push-button electric starting with a cold weather starting aid as standard equipment, center positioned gear shift lever, parking brakes, throttle located at right arm rest and a two-man upholstered seat. Its rated horsepower is 126.

Neoprene-nylon telescopic-sleeve protectors on a rock drill

Telescopic-Sleeve Protector

A & A MANUFACTURING CO., 2017 W. Clybourn, Milwaukee 3, Wis., is producing telescopic-sleeve protectors for application in the rock drilling field. The sleeve is fabricated from neoprene-nylon and is made to order without mold charges. These Gortite sleeves are made in various styles. The manufacturer claims that they are impervious to oil, grease and water and can withstand temperature changes from -45 deg. F. to 220 deg. F., without cracking.

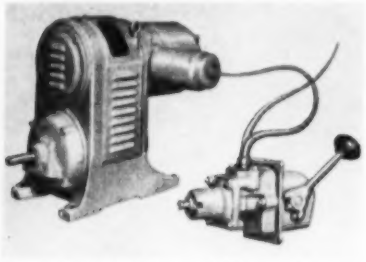
Portable Space Heater

BICA Co., 1170 N. State St., Girard, Ohio, has introduced a portable space heater for temporary heating, called the Sonic-Ray Heater. It burns propane gas and has an output of from 85,000 to 150,000 B.t.u. per hr. The heater operates from 40 to 63 hr. on a 100-lb. tank of gas and is said to cost an average of 11 to 17 cents per hr. to operate. It is 31 in. high, weighs 31 lb. and is made of heavy gauge steel, spot welded.

Propane-burning space heater

Motor Control

U.S. ELECTRICAL MOTORS INC., 200 E. Slauson Ave., Los Angeles 54, Calif., has developed a pneumatic remote control unit for varying the speed of its motors. The control consists of a positioning unit—an air operated plunger attached to the Varidrive speed changing device and an air valve which remotely controls the positioning unit. Four types of valves are available depending upon the method desired to operate the mechanism, by pedal, lever, cam or wheel. The positioning units are designed to operate with an air pressure of either 60 or 100 p.s.i.



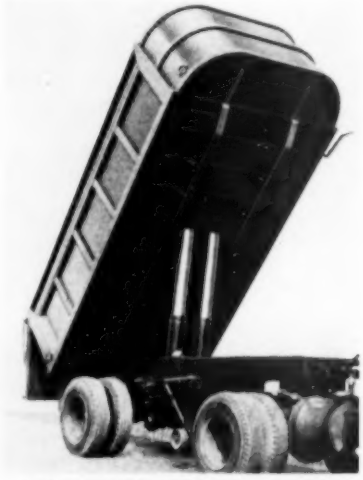
Pneumatic control for variable speed motors

Through the use of check valves and control station selectors in the system, the speed of the Varidrive can be changed from any number of control stations. Conversely, any number of Varidrives may be controlled by one station providing they are to operate at the same speeds.

If desired, the pneumatic control may be used to provide speed changes from one preset finite speed to another by one movement.

Portable Air Compressor

LE ROI Co., 1706 S. 68th St., Milwaukee 14, Wis., has added five new sizes of portable air compressors to its line. The new capacities are 85, 125, 250 and 365 c.f.m. The company offers nine capacities and all but the smallest three can be supplied with its gasoline engines or International Harvester diesel engines. A choice of International Harvester, Murphy or Caterpillar engines is offered with the 600 c.f.m. model.



Trailer dump of up to 20 cu. yd. capacity

Single-Axle Packaged Trailer Dump

THE GALION ALLSTEEL BODY CO., Galion, Ohio, has introduced a new line of single-axle package trailer dumps of up to 20 cu. yd. capacity. Known as Galion Model 12, the body is constructed of 10-gauge steel. It is 88 in. wide inside and has 32 in. sides and 44 in. ends. Standard equipment includes 12-in. steel removable side boards. Length can be varied up to 18 ft. to provide any desired yardage capacity.

Dumping is handled by the manufacturer's Model 77142 hoist. This consists of two 7-in. twin-ram single-stage telescopic cylinders. Rated hoist capacity is 18 tons.

The trailer suspension is of heavy-duty alloy main and auxiliary springs, one fixed and one adjustable radius rod, with flat top frame section. It is furnished with either a power fifth wheel or wet hose mounting. Tire sizes and brakes are available in several options to meet individual load and service requirements.

Molybdenum-Manganese Electrodes for Surfacing

STOODY Co., Whittier, Calif., has announced the production of a molybdenum-manganese material for manual welding which is also available in coils for automatic application, to supplement its nickel manganese electrodes. The new electrodes contain 14-15 percent manganese, with deposits showing full Hadfield properties. Physical properties of bare moly-manganese as deposited are as follows: Rockwell hardness 85-90 B, and as cold worked, 43-47 C; tensile strength, 100,000 p.s.i.; yield strength, 85,000 p.s.i.; elongation in 2 in., 14 percent; deposits non-magnetic. The moly-manganese electrode is designed primarily as a build-up material for manganese steel parts. Deposits of the bare rod possess maximum physical properties and have weldability approaching the conventional coated electrodes. Sizes are 14 in. length, and $\frac{5}{32}$, $\frac{3}{16}$ and $\frac{1}{4}$ in. diameters.

Variable Speed Drive

DODGE MANUFACTURING CORP., 1938 William St., Mishawaka, Ind., has announced a variable speed drive incorporating the Taper-Lock principle. Engineering features in the four units which comprise the drive are claimed to cut down time on speed changes and to increase production.

Variable speed drive on spinning frame

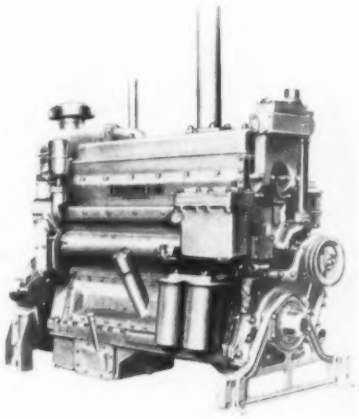
Components of the drive are: (1) a variable pitch motor sheave; (2) a set of wide range belts; (3) a companion sheave; (4) a slide motor base. The Taper-Lock principle is used in the bushings for both sheaves in the drive. The variable sheave assembly locks on the motor shaft as a unit with a turn of a screw. The pitch diameter is changed by means of a one-point adjustment. The single adjusting screw may be located at either end of the sheave although

normally the sheave is factory assembled with the adjusting point located on the motor side. The grooved companion sheave in the drive is factory-balanced and has no projecting parts. The slide motor base permits changes in center distances to preserve proper belt tension as the variable sheave is adjusted for different speeds. It is available in a full range of sizes for N.E.M.A. frame motors.

High Speed Diesel Engine

CATERPILLAR TRACTOR CO., Peoria 8, Ill., is producing a high-speed diesel engine, designated the D326. The engine is offered in industrial, electric set and marine arrangements, as follows:

1. D326—intermittent output rating of 170 hp. at 2000 r.p.m.; weight approximately 3650 lb.
2. D326 Electric Set—12-hr. rated output of 80 kw.; set available as a 50-cycle unit.
3. D326 Marine Engine—on 24-hr. continuous duty, produces 118 hp. at 1600 r.p.m.



Diesel engine

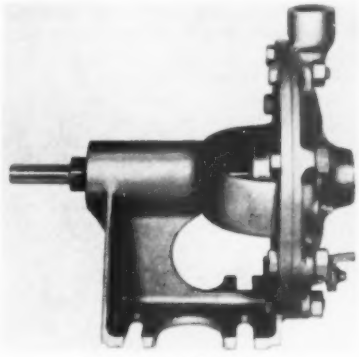
The basic D326 engine is six-cylinder and has a 5⅛-in. bore and 6-in. stroke. The pumps are mounted directly adjacent to the cylinders they serve, and the fuel lines are made short and identical. These pumps, as well as the intake and exhaust valves, are actuated by a single camshaft. Both engines include special heat resisting metal inserts in the tops of pistons and the valve seats. Main and connecting rod bearings are precision-type, of steel-backed aluminum with high fatigue resistance. Piston cooling is by means of oil jets from under-mounted nozzles.

Vibrating Table

CLEVELAND VIBRATOR CO., 2828 Clinton Ave., Cleveland, Ohio, has available a vibrating table with a 12- x 18- x 1½-in. table top, which floats on heavy steel springs and is 36 in. from the floor. Intensity of vibration can be varied by a pressure control regulator, permitting operation at 20 to 100 p.s.i. line pressure. The vibrator, fastened under the table, is controlled by a knee valve. Standard equipment includes air line filter, automatic lubricator, pressure control regulator and gauge.

Hose Couplings

HOSE ACCESSORIES CO., 2704 N. 17th St., Philadelphia 32, Penn., has added Le-Hi Series 900 brass long-shank hose couplings constructed of machined brass bar stock to its line of hose couplings. The product is claimed to be leak-proof and non-porous. The couplings are adaptable for a variety of industrial rubber hose applications, including low pressure steam and spray, as well as in petroleum service because of its non-sparking safety features. The manufacturer is also producing the Le-Hi Series 650 Type SC steel combination hose nipples. The nipples are made of one piece steel tubing. They are suitable for a variety of industrial hose applications including use on the straight end hose. These are available in all popular sizes, plain and rust-proofed and also produced in brass and malleable iron.



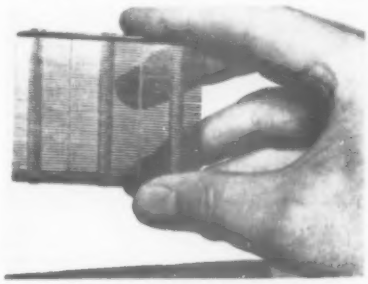
Reversible centrifugal pump

Centrifugal Pump

GARDNER-DENVER CO., 100 Williamson St., Quincy, Ill., has announced a new centrifugal pump which operates with equal efficiency when rotated in either direction. Known as the Gardner-Denver Model CAY, the pump was designed primarily for circulating cooling water in air compressors, diesel and gasoline engines, and other water-cooled machines. Advantages of the reversible pump are said to include easy installation in any position on a machine, simplified piping design, and adaptability to any type of drive. It has successfully been installed on either side of the same machine without turning the pump around when moving it from one side to the other. It is suitable for heads up to 50 ft. and capacities up to 67 g.p.m. The pump is fitted with two prelubricated ball bearings, and has a mechanical seal that is said to eliminate stuffing box leakage.

Fine Material Screen

HENDRICK MANUFACTURING CO., 33 Dundaff St., Carbondale, Penn., has developed a Wedg-Slot screen for processing fine materials. It is made with stainless steel bars that have a V-shape profile that is effective for dewatering, drying, filtering, heavy-media recovery, wet screening and centrifuging. The bars are of two types: Type 10A for openings ranging from 0.004 to 0.04 in.; Type 15A for openings from 0.012 to 0.06 in. Slot spacings between rivets is 1 in. Special spacing lugs between the profile bars lock the mesh. The bars can be provided with tension clasps for either side or end tension, interchangeable with any other tensioned screen type, for any make of vibrator. Installations can also be made without tension clasps for shakers, vibrators, and stationary equipment, by bolting, clamping between rubber strips, or clamping over bucker-up bars of vibrating equipment.



Section of screen for fine materials

Portable Loading Ramp Unit

JOHN B. ILLO ENGINEERING CO., 2414 E. 57th St., Los Angeles 58, Calif., has introduced a portable loading ramp unit with push-button control. It can be installed in 5 min. at any loading dock and its hydraulically operated dock can be adjusted to any truck bed height in a few seconds. The unit is available in two types, manual and electrically powered. The electrically operated unit requires a 110-volt outlet. Fork lifts can be driven right onto trucks and the diamond floor plated deck assures good traction. An adjustable throw plate can be raised or lowered for installation inside buildings without interfering with doors. The throw plate can be locked in horizontal position during loading, as can the deck, preventing accidental moving.

The unitized power unit assembly consists of 110-volt, single phase, ½-hp. ball-bearing drip-proof motor directly connected to a ⅝-in. standard Viking 350 p.s.i. pressure hydraulic pump. It has a capacity of 20,000 lb.

Sound Business Practices Build

PROFITABLE AGSTONE SALES

Riddle Quarries, Marion, Kan., operates own soil testing and spreading service and stockpiles agstone convenient to farmer customers

By TIP BROWN

RIDDLE QUARRIES, INC., and Riddle Soils Service, Inc., with operations centering at Marion in central Kansas, 50 miles north of Wichita, were born of disaster but in the seven years of their existence have grown into an industry far beyond the original intent of the founder, John H. Riddle.

A graduate of the Missouri School of Mines at Rolla, Mr. Riddle had long devoted his time to municipal engineering and in 1944 was engaged in supervising soil conservation factors in the development of the Wichita, Kan., air base. He met with an accident falling under a combine and was hospitalized for 11 months with increasingly slow improvement and a marked loss of morale. A local physician and personal friend from his home town of Marion who was visiting him fell back upon a mental stimulant of using the then current crusade for more food for the war effort and the great opportunity for utilization of the underground limestone resources of the home county to produce agricultural limestone as well as to supply stone for roads constantly in need of upkeep. The suggestion fell upon fertile soil.

Before long, a small quarry outfit was bought for starting operations at a site 1½ miles from Marion. The business met with immediate public acceptance and in the succeeding years has expanded to include, besides limestone and rock production, ready-mixed concrete, contracting, and a special department for soil service with wide distribution of rock phosphate and other specially prepared fertilizers. The territory has now grown to a 40,000 sq. mi. area in 18 Kansas counties of the rich wheat and cattle belt. There are 70 people in the organization and because of absentee ownership of land, the Marion office does business nationally.

The Cottonwood river and its tributaries spreading out west of Emporia are lush feeding grounds for beef cattle as well as wheat, and demand uniformly good soil fertility. The rolling grazing country was a favorite of the vanished buffalos and their instincts confined them to these ranges heavily underlaid with limestone.

Quarry Production

The Marion quarry comprises 66 acres with an overburden of 2 or 3 ft. and presently has a face 16 to 18 ft. in depth and extending for half a mile. The limestone is a hard but flaky combination of the Cottonwood, Ft. Riley and Iola limestones, running 90 percent calcium or better. Operations were started on agricultural limestone on October 17, 1945, and for a very good reason they continued at a maximum level for three months. The new firm was heavily in debt, largely from money borrowed from the Reconstruction Finance Corporation under loan provisions of the Small War Plants set-up.

A second quarry has since been opened 7 miles from Little River in Rice county, Kan., about 70 miles from Marion, where there is a similar type of limestone and overburden but with a reddish tone in color and with small amounts of quartzite in the formation. About 16,000 tons of agricultural limestone and road stone are stockpiled there to take care of local needs.

The Marion quarry is used as a concentration point for the large amount of equipment that is necessary to take care of the production and distribution features. A repair shop keeps equipment in top form. A battery of 20 trucks of 8 ton capacity and equipped with special distributing devices on the rear take care of the agstone distribution; two similar sized trucks of Baughman bed and special spreaders in the rear are used for phosphate.

A new mobile primary set-up in the quarry gives promise of expansion for use in widely scattered locations where local rock deposits can be used to save long freight hauls which have been undergoing steady freight increases and are reflected in the higher delivered costs. The equipment consists of a diesel, crawler-type

One of Riddle's "mobile" spreading crews with its equipment at the Marion quarry

Northwest 25 shovel, with an accompanying 24- x 36-in. Universal crusher, to crush down to 4-in. size, mounted on a Universal carrier. The versatility of this equipment makes it of great practical value in speeding up local operations and as a portable outfit, each carrying substantial operating economies.

The secondary crushing plant is equipped with a Williams 40-in. slugger hammermill with auxiliary Williams and Dixie hammermills and special grading facilities of one triple-deck, one double-deck, and one single-deck Deister slotted type screens. These "Ag-Lime" screens were especially designed to minimize blinding due to moisture in the finer sizes. The crushing plant has 200 t.p.h. capacity.

Large quantities of stone for road construction and maintenance are shipped from both quarries and selected stone is used on local concrete work. A recent activity of supplying calcium chloride to keep down dust and harden secondary highways has been added to the facilities of the company and is meeting a popular need. An application of 2 lb. per sq. yd. as a top dressing successfully takes care of the dust problem and approaches pavement-like hardness for a period of six months.

A spur of the Chicago, Rock Island and Pacific railroad has been built from the main line to the quarry and is used for unloading incoming materials and loading out agstone and stone. Similar facilities are located on the Santa Fe in the town of Marion. Phosphate from Idaho and Wyoming is brought to the site in covered hoppered-bottom cars and is unloaded by a mechanical auger into adjoining storage bins or directly into the phosphate distribution trucks. State law requires canvas covering of loaded trucks to prevent wind blowing the material. The track is also used for unloading cars of cement for the adjoining ready-mixed concrete operations. The plant has a 15 cu. yd. capacity Binanbatch made by Winslow Scale Co. with bin and scales. Two 5-cu. yd. Smith transit mixers on tandem axle trucks complete the ready-mixed concrete equipment.

The need for ready-mixed concrete developed as a result of emergency construction arising from the devastating effects of the great flood in July of last year which inundated the low sections of the area, displacing large numbers of home owners and causing more than a $1,000,000 loss to the town of Marion with its population of 2300. The "Fanny May" emergency arm of the federal government came to the rescue of the stricken community with an offer of financing home replacements for flood victims not to exceed $7000.

Mr. Riddle, as a contractor, was alloted 25 of these houses. The economy of using concrete for foundations and floors was immediately apparent.

A ready-mixed concrete plant is also located at the Marion quarry

Water and sewer extensions were mandatory together with 15 blocks of curb and gutter work. Added to other flood damage replacements, a ready-mixed concrete service offered an answer to the need for quick and economical replacements at a time when manpower was extremely scarce. Following the flood emergency, other construction has arisen to justify continued operation of the ready-mixed concrete plant.

Soils Service, Inc.

The quarries have provided the production and wholesale outlet of the Riddle industries but it became increasingly necessary to establish a retail and service department for the expanding demands that came as a result of the federal aid program of soil conservation. The interests of the state of Kansas are handled through Kansas State College at Manhattan and the local administration is through farmer-elected boards in cooperation with the county agents. The entire plan functions under the National Production and Marketing Administration. Farmers who qualify are granted a 50 percent aid in the cost of agricultural liming operations and substantial aid on fertilizer needs. Agricultural limestone acts as a soil sweetener and conditioner. Specifications require 90 percent shall pass through an 8-mesh sieve and 25 percent through a 100-mesh sieve. Stockpiles are tested regularly and supervisors at the quarries make several daily samplings.

Riddle Soils Service, Inc., the retail end of the business, maintains a storage warehouse for bagged fertilizers brought in from Joplin, Mo., and Lawrence, Kan. It distributes the entire agricultural limestone production of the quarries under close working arrangements with the local P.M.A.

The spreading service includes three scheduled swings by two crews in the fall, winter and spring throughout the entire territory. A crew consists of a field man, crane operator who loads trucks from either cars or stockpiles, and six truckers to handle distribution and spreading. The equipment includes an automoble for the field man, traveling crane, six Ford trucks equipped with New Leader beds and spreaders. Before a crew enters an area, a mailing of about 20,000 post cards is sent to rural box holders throughout 18 counties notifying them of the time of the appearance of the crews so that farmers may comply with necessary P.M.A. regulations to permit liming of their soil. The field men are equipped with soil testing kits which indicate the needs for limestone and phosphate. Laboratories have been springing up over the area in county seat towns under the supervision of the county agents whereby farmers may bring in a 3- or 4-lb. soil sample and for $1.00 learn the soil deficiencies and the amount of materials in pounds necessary to start improvement. The customary spread is around 1000 lb. of phosphate per acre and

(Continued on page 108)

HIGH TEMPERATURE X-RAY SPECTROGRAMS OF CALCIUM SILICATES AND CEMENT CLINKERS

By GERHARD TROMEL* AND HERMANN MOLLER*

THE PRESENT fundamental knowledge of the formation and behavior of those calcium compounds whose hydraulic properties are important for portland cements depends principally on investigations of polyphase systems such as $CaO\text{-}SiO_2$ and $CaO\text{-}SiO_2\text{-}Al_2O_3$ and at as high temperatures as are reached in clinker burning. The research results, as plotted in the phase diagram, are usually obtained by holding a specimen of known composition at a definite high temperature until equilibrium is reached, following which it is quenched as rapidly as possible. It is assumed in this way to be able to obtain the high temperature phase sufficiently stable at room temperatures to be able to make microscopic or x-ray studies of the compounds or crystal types which are formed at high temperature.

In many cases it is indeed possible to draw reliable conclusions about the compounds at high temperature, especially where melts occur which can be cooled as glasses. Nevertheless sufficient consideration has hardly been given as to the accuracy of the compounds developed in the quenching operation.

However, recently with one of the chief constituents of cement clinkers, calcium orthosilicate, $2CaO{\cdot}SiO_2$, (belite), proof has been obtained that with this compound certain phenomena occur which cannot be suppressed by sharp cooling. These are the transformations into the different modifications of this compound. X-ray studies at high temperatures of specimens of calcium orthosilicate have now caused considerable changes in our knowledge of the relationships of the different modifications.

In this connection the proof developed recently by W. R. Foster[1] concerning the magnesium metasilicate, $MgSiO_3$, has considerable significance. He also was able to show that the previous quenching results gave inaccurate information about the kinds of crystals existing at high temperatures.

With orthosilicates such as Ca_2SiO_4 which are characterized in their structure by single SiO_4 tetrahedra, it was not very surprising that transformation would occur during the quenching of the silicate $MgSiO_3$ with its unlimited binding of the SiO_4 tetrahedra in endless chains. It became apparent that transformations of the arrangements of the atoms would readily occur during quenching, as was underscored by the findings of W. R. Foster.

Direct Formation of Crystal Types at High Temperatures

It therefore seems logical to determine what the significance of this new knowledge might be for the formation and structure of clinkers. At the same time it should be determined whether x-ray spectrograms made at high temperatures might not also be significant for other parts of the $CaO\text{-}SiO_2$ phase diagrams and hence might have significance for important cement clinker problems.

Production of Spectrograms at High Temperatures

Some time ago D. Wilm, U. Hofmann and K. Endell[2] proved that it is practicable to make x-ray photographs at high temperatures for the solution of ceramic problems. For opal and kaolin they used a Siemens & Halske camera, developed by H. Lehmann, which contained at the axis of a cylinder a narrow thin walled carbon tube which was heated electrically. The powder preparation to be studied was placed inside the carbon tube together with the junction of a platinum-platinum rhodium thermocouple. The whole camera was then evacuated.

We have had for some time a heated camera for powders developed by H. Seemann.[3] This arrangement is a cylindrical camera having a diameter of 120 mm. with two separate, superimposed heating elements which are arranged so as to leave a free space of 5 mm. inside the camera and perpendicular to the axis of the cylinder. In this space lie the diaphragms for the entrance and exit of the x-rays, which then pass through the rod-shaped preparation and the thermocouple. In this way the tip of the thermocouple and the position encountered by the x-rays lie close together. We have also measured the temperature of the specimen optically through one of the diaphragms. The values so obtained checked those obtained with the thermocouple. Since a single photograph requires only 5 mm. width of the film, the cassette can be moved so that five pictures can be obtained on each film. In this way it is very easy to follow slow changes at a constant temperature. Similarly without intermediate cooling the transformations of a preparation can be followed at different temperatures.

With a platinum wire heating element it was not possible to take pictures above 1100 deg. C. Platinum evaporates so rapidly that the somewhat cooler preparation is covered with the metal and only gives platinum lines. It has been shown[4] that the evaporation of the platinum depends upon the presence of oxygen. Therefore we took our pictures in dry and oxygen-free nitrogen. The evaporation of the platinum was practically prevented. For purification of the nitrogen we used the apparatus developed by R. Fricke,[5] in which the oxygen was absorbed by copper precipitated on diatomaceous earth.

The preparation was made by cementing the powder on to a 0.3 mm. thick platinum wire with a dilute solution of celluloid in acetone. Although this binder burns out very rapidly the preparation gave no trouble due to crumbling. All photographs were made with Cu-K α rays.

In this way, using a heating element of 70 percent platinum and 30 percent rhodium, it was not difficult to work at 1500 deg. C. It is true that the life of the heating element is not too great at this temperature.

We have been able through partial changes in the arrangement to work at higher temperatures, even at 1700 deg. C. In this the given preparation was held on a very narrow hairpin of platinum-rhodium wire which itself was electrically heated. In order to keep the radiation loss of the preparation from getting too high, the previously described heating element of the camera was maintained at constant temperature of about 1200 deg. C. This temperature was measured optically.

In this way we could not completely control all the difficulties of the Seemann camera. The current for heating the preparation especially showed variations. However, by suitable changes this can be brought under control to permit working at 1700 deg. C. satisfactorily.

*Max Planck Institute for Iron Investigation, Dusseldorf, Germany.
Translated by F. O. Anderegg.

Modifications of Calcium Orthosilicate

According to the phase diagram for $CaO\text{-}SiO_2$, it has previously been assumed that the orthosilicate has three different modifications, which go reversibly from one form to another as

$$\alpha \xleftrightarrow{1420^\circ\ C.} \beta \xleftrightarrow{675^\circ\ C.} \gamma$$

At the highest temperatures (from about 1420 deg. C. to the melting point) careful measurements showed the stable α-modification to be monoclinic or triclinic with considerable twinning. It was assumed that the rhombohedral β-modification was the stable one from 675-1420 deg. C. Therefore it had been concluded generally that dicalcium silicate found in clinker directly on burning was chiefly present as the β-modification. The upper temperature limit for the room temperature stable γ-modification was given as 675 deg. C.

Certain doubts have been raised and verified concerning the kinds of different modifications of dicalcium silicate. H. Insley[7] in 1928 presented the completely correct interpretation that all results ascribed as α-$2CaO\cdot SiO_2$ really applied to β-$2CaO\cdot SiO_2$ and that no one had actually had a chance to study the high temperature modification. Nevertheless the work of N. Sundius[8] and E. Brandenburger[9] was opposed. These men believed they could recognize the α-modification based on their careful microscopic and x-ray studies, which could readily be distinguished from the β-$2CaO\cdot SiO_2$. The discussion then appeared to be ended and the doubts concerning the data in the phase diagram were not often mentioned.

This problem was brought up again from another viewpoint based on the work of M. A. Bredig[6] on the structure of the cementing group A_2O_3. Based on the crystal chemistry it seemed probable that the compound $2CaO\cdot SiO_2$, or Ca_2SiO_4, must possess the same structure as the hexagonal or the rhombohedral modification K_2SO_4, a quite different structure than had previously been observed.

K. T. Greene[10] also definitely proved the hexagonal structure proposed by Bredig when he prepared mixed crystals of 90 percent $2CaO\cdot SiO_2$ and 10 percent $(CaO + Na_2O + Al_2O_3)$. At the same time A. van Valkenburg and H. F. McMurdie[11] found that the hexagonal structure for $2CaO\cdot SiO_2$ at 1500 deg. C. corresponded to αK_2SO_4.

We have completely succeeded[12] by means of systematic x-ray exposures at different temperatures up to 1500 deg. C. in checking the proposals of Bredig and at the same time have secured information on the stability range of the β- and of the α-$2CaO\cdot SiO_2$. The last doubts have been removed and the old ideas about polymorphic modifications of the disilicate can no longer be considered correct.

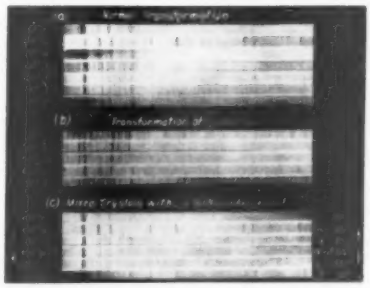


Fig. 1: X-ray spectrograms. (a) Normal transformation of $2CaO\cdot SiO_2$. (b) Transformation of αCa_2SiO_4 upon heating. (c) Spectrogram obtained by heating mixed crystals

Recently Mr. Bredig has given a complete statement of the different research results,[13] and K. Spangenberg[14] has comprehensively discussed these changes.

The correct picture of the different modifications of $2CaO\cdot SiO_2$ can best be determined by means of x-ray photographs at different temperatures.

In Fig. 1a a series of such high temperature spectrograms is reproduced. At 1500 deg. C. this compound has a diagram corresponding to a hexagonal structure, which is closely related to glaserite $(K, Na)_3SO_4$ or to αK_2SO_4. This hexagonal α-modification changes in cooling into the rhombic α'-structure, the existence of which M. A. Bredig had proposed and for the structure of which he had claimed a close relation to βK_2SO_4. This $\alpha' Ca_2SiO_4$ remains stable up to 700 deg. C. Only by further cooling is the long known βCa_2SiO_4, the belite of cement clinker, formed. The latter is not, as previously assumed, a high temperature modification, but is only stable below 700 deg. C. In the English literature the α'-$2CaO\cdot SiO_2$ has been designated "bredigite" based on the work of Bredig in clearing up the polymorphism of this compound.

From these high temperature results it is seen that previous investigations were correct concerning the transformation point but not as to the kinds of stable crystals.

In this diagram of the different modifications of $2CaO\cdot SiO_2$ the long known α-modification is lacking. This depends on the actual difficulties in including it in the diagram.

The γ-phase is regularly obtained on heating a mixture of calcite and silica. This is definitely recognized by the formation on cooling and by the dusting phenomenon. Such preparation remains stable on heating as shown in the group of Fig. 1b, at much higher temperature than the usually stated upper limit of 675 deg. C. Only at 850 deg. C. does one secure a mixed spectrogram of γ and α'; in other words, at this temperature only a gradual transformation takes place, while at 1000 deg. C. this change is rapidly completed.

Based on this finding, Bredig concluded that the γ-phase was stable at room temperature while the β-phase was only metastable. R. W. Nurse[15] concludes that this interpretation is correct, based on careful thermal studies with considerable refinements. Since it is readily possible to suppress the change from β- into γ-$2CaO\cdot SiO_2$, and indeed without foreign admixture, certain considerations must remain correct which have been brought out especially from the following experience.

After the transformation γ-α' in the high temperature camera it has not been possible with the small amounts of material studied, even on slow cooling, to reform the γ-phase from one of the other kinds of crystals. One only obtains the phases α, α' and β which transform without appreciable retarding into each other at 1400 and 675 deg. C.

On the other hand, by heating a larger amount of the γ-preparation outside the camera above 1000 deg. C., one obtains after the first heating and cooling a mixture of γ and β. On repeated running of this experiment the amount of the γ-phase decreases appreciably, and our preparation after the third heating and cooling remained present only as β Ca_2SiO_4 which on very slow cooling and on long storage showed no transformation to the γ-form.

These previously noted results were explained by R. W. Nurse as a stabilization of the β-form by CaO. However, since this effect is possible with essentially pure $2CaO\cdot SiO_2$, and since general experience shows that this γ-phase is formed much more smoothly when CaO is absent, it appears to be possible that actually two phases of different composition are involved.

It will only be possible through comprehensive research in the equilibrium relations of the different phases to establish clearly the variable behavior of the dicalcium silicate compositions.

It is indeed desirable to call attention to the fact that between Bredig's work and that of Nurse and ourselves only small differences occur. When Bredig says β-$2CaO\cdot SiO_2$ is metastable, the only thing to admit is that a new conception is being proposed. This involves naturally the question as to why such an actually unstable phase is often stable or what are the causes for the retardation of the transformation into the stable phases. An important factor in the solution of this problem is the variation in the composition which we have mentioned. The differences in the structure of the β- and the γ-$2CaO\cdot SiO_2$ are very important because of the necessary energy release during a change from one phase into another. The formation of the required nuclei is concerned in this problem. There is not much use in going into these and similar points until very comprehensive research results are available

so that we can know upon what it actually depends, whether and at what temperature the β-form changes into the γ-silicate.

The mixed crystals of $2CaO \cdot SiO_2$ prepared and studied by K. T. Greene[10] and having the composition 89.8 percent C_2S, 3.6 percent CaO, 2.8 percent Na_2O and 3.8 percent Al_2O_3, require especial consideration. With these preparations Greene obtained the hexagonal α-modification by quenching, so that it may be assumed that the velocity of the α-α' transformation is lowered in these mixed crystals.

Since the α'-phase had not been found after quenching, we have studied these mixed crystals by means of powder spectrograms up to high temperatures (Fig. 1c). In that way we secured results with pure dicalcium silicate which fully correspond to the transformation temperature. At 1400 deg. C. the α-form is present while at 1300 deg. C., on the other hand, α'-form is found. The temperature of this transformation is appreciably lower than for the pure disilicate. The same is true for the change α'-β. Here we established that the change sets in only on cooling below 600 deg. C. At 550 deg. C. the two phases α' and β are both stable. Only at 500 deg. is the change complete. This region of two stable phases is also passed through during the heating, indicating, as found with the microscope, that mixed crystals are present. The temperature limit of this region lies 50 deg. higher on heating than on cooling. This retardation of the transformation is understood when one remembers that separation of the mixed crystals on cooling was observed by K. T. Greene with the microscope.

These differences between the x-ray spectrograms at high temperatures and the quenching experiments are again a definite example that undercooling experiments are not necessarily a sure method of elucidation of the stability relations.

In different trials, to become acquainted with the system CaO-SiO_2 and especially the disilicate compound, it is noteworthy that the proposals of V. M. Goldschmidt have resulted in the use of a lower melting model system. In this case the system NaF-BeF_2 proved to be an exact model for the system CaO-SiO_2. H. O'Daniel and L. Tscheischwili[16] were able to shed light on the crystal structure of the α-$2CaO \cdot SiO_2$. More recently E. Thilo[17] has carried the study of this model farther. The results are consistent with the results obtained in the studies on $2CaO \cdot SiO_2$ itself; thus for example Na_2BeF_4, just as with Ca_2SiO_4 in its stable form at the highest temperature, has an hexagonal structure, which bears the same relation to Na_2SO_4 as does α-$2CaO \cdot SiO_2$.

X-Ray Spectrograms of $3CaO \cdot SiO_2$ up to 1700 deg. C.

This new knowledge of the modifications of calcium orthosilicate which has effected considerable changes in the phase diagram CaO-SiO_2, suggests that it might be well worth while to make spectrograms of tricalcium silicate, the alite of cement clinker, at high temperatures. It is known that this compound has another crystal structure at high temperature than it has at room temperature.[18] We have therefore prepared very pure tricalcium silicate by repeated heating of a mixture of calcium carbonate and silica at 1500 deg. C. The different spectrograms shown in Fig. 2 were obtained from that. It may clearly

Fig. 2: X-ray spectrogram of $3CaO \cdot SiO_2$ at temperatures up to 1700 deg. C.

be seen that up to the highest temperature of 1700 deg. C. the same diagram was obtained. It is true that certain changes in the intensity of single lines may be seen and especially at increasing temperatures a splitting of one strong line. Since this change, however, does not start at any particular temperature, but rather follows dependent upon the temperature, it is to be regarded as due to thermal expansion. Any evidence of polymorphic changes of tricalcium silicate on heating and on cooling has not been obtained.

It is especially noteworthy that the 1000 deg. C. spectrogram shows the diagram of the tricalcium silicate unchanged. On the basis of various studies, especially those of E. T. Carlson,[19] it is generally assumed that the trisilicate below 1250 deg. C. is unstable and breaks down to $2CaO \cdot SiO_2$ and CaO. This breakdown, however, must occur only very slowly. According to Carlson, in 23 hr. at 1150 deg. C., 17.5 percent CaO is formed, therefore we left our preparation in the high temperature camera for 24 hr. at this temperature and made spectrograms at different times to see whether such a decomposition actually occurs. We always obtained the unchanged $3CaO \cdot SiO_2$. Since only small amounts of CaO are readily seen in the spectrogram, one must reach the conclusion that the decomposition described by Carlson did not occur for us. It would be desirable to lengthen the heating time considerably. In order to determine whether $3CaO \cdot SiO_2$ is actually unstable below 1250 deg. C., it is not entirely necessary to take spectrograms at high temperatures. However, since this does not interest us greatly at present, we have not followed it any further. We might, however, remark that Carlson in his research has established that $3CaO \cdot SiO_2$ has a strong tendency to decompose, when it has an opportunity to react with moisture in the air. It seems to us, therefore, as not impossible that the decomposition described by him does not mean that $3CaO \cdot SiO_2$ is unstable.

It is often forgotten that substances high in lime such as we are considering are very reactive with water vapor. A known example is the formation of hydroxyl apatite $Ca_{10}(PO_4)_6(OH)_2$ from $4CaO \cdot P_2O_5$, which runs very rapidly at 1100 deg. C. with normal air moisture.[20] We have heated $3CaO \cdot SiO_2$ in carefully dried nitrogen, whereas Carlson did not concern himself with the air moisture. It seems to us, therefore, that this decomposition of $3CaO \cdot SiO_2$ might well have been due to a reaction with water, such as occurs at room temperature, and depends upon the hydraulic property of this compound.

High Temperature Spectrograms of Mixtures of $2CaO \cdot SiO_2$ and $3CaO \cdot SiO_2$

After we had characterized the pure di and tricalcium silicates at different temperatures, spectrograms were made of mixtures at different temperatures. Fig. 3 shows the diagrams obtained at 20 deg., 1000 deg. and 1500 deg. C.

It is clearly seen that at each temperature we have an overlapping of the spectra of the pure compounds. It is of great interest to determine the minimum content of each compound which will indicate its presence in the spectrograms. The spectrogram of a mixture of $2CaO \cdot SiO_2$ with 5 percent excess lime should give a

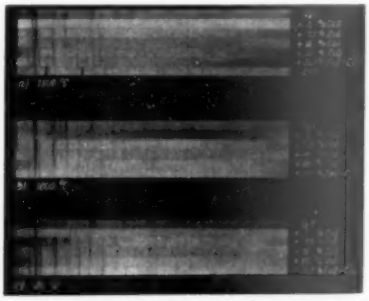


Fig. 3: X-ray spectrograms of mixtures of $2CaO \cdot SiO_2$ and $3CaO \cdot SiO_2$ at 20, 1000 and 1500 deg. C.

composition 80.6 percent $2CaO \cdot SiO_2$ and 19.4 percent $3CaO \cdot SiO_2$. It does not show the presence of the trisilicate at 1500 deg. or at 1000 deg. C., although it does at 20 deg. C. This is clear evidence that $2CaO \cdot SiO_2$ forms mixed crystals with $3CaO \cdot SiO_2$. The extent of the mixed crystal formation seems to vary with the different modifications. These spectrograms do not permit more exact interpretation.

In the case of the β-α' transformation of $2CaO \cdot SiO_2$, we have studied how far it is affected by the presence of lime. Fig. 4 reproduces a set of such spectrograms at 650 deg. C. The same diagram occurs as at 20 deg., that of the β-$2CaO \cdot SiO_2$. At 700 deg. C. the lines of the α' form are seen.

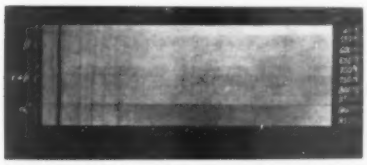


Fig. 4: The β-α' transformation of $2CaO \cdot SiO_2$ in the presence of excess CaO

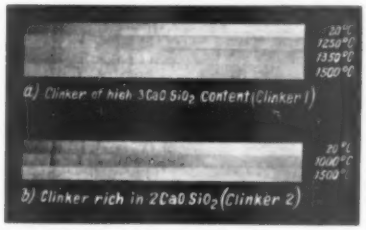


Fig. 5: Spectrograms of clinkers (compositions tabulated in Table 1); (a) clinker 1, (b) clinker 2

Almost the same picture is obtained at 750 and 800 deg. C. Finally at 850 deg. C. the lines of the β-form disappeared. There was a very definite temperature region in which the β- and α'-modifications were both stable. Since no such region could be observed with pure $2CaO \cdot SiO_2$ in which both of these forms occurred simultaneously, this is again a proof that $2CaO \cdot SiO_2$ with excess lime, or $3CaO \cdot SiO_2$, is present in mixed crystals.

High Temperature Spectrograms of Technical Clinkers

So far only the purest synthetic calcium silicates have been used for x-ray spectrograms at high temperatures. Now, however, it is shown in Fig. 5 what results have been obtained with technical clinkers, whose composition is given in Table I*. The spectrogram of clinker 1, which by calculation and microscopic observation is high in $3CaO \cdot SiO_2$, shows at all temperatures the same diagram as this compound. Incidentally, in these spectrograms, made with Cu-K rays, such iron-containing crystals as $6CaO \cdot 2Al_2O_3 \cdot Fe_2O_3$, are difficult to recognize. The cause seems to lie in a strong general darkening of the film. Therefore, it is not surprising that the lines of these crystals cannot be seen, although they are surely to be expected.

Clinker 2, containing mostly $2CaO \cdot SiO_2$, shows in the 20 deg. C. diagram in addition to the lines of β-$2CaO \cdot SiO_2$, the strongest lines of $3CaO \cdot SiO_2$. Finally at 1500 deg. only the strongest lines of α-$2CaO \cdot SiO_2$ are visible.

Conclusions and Discussion of Future Experiments

For observations concerning the formation of cement clinker the results given are important in indicating the same connections as in a pure compound system. From that it is obvious that the new results have significance for the study of the equilibria in this system and for future research and development of cement. An example might be cited, namely the microscopic studies of clinker by B. Travasci[21] and H. Insley,[22] who found different types of belite, which can be explained as due to variations in the transformation procedure during cooling, if they did not perhaps deal with different modifications of $2CaO \cdot SiO_2$. It seems very necessary therefore to study the polycomponent system as well as technical clinkers as accurately as possible with the help of x-ray spectrograms at high temperatures. In that way it should be possible to check the often raised questions concerning the capacity of the single phases to form mixed crystals.

The formation of mixed crystals is greatly influenced by the kinds of crystals of the calcium silicates. Certain of the crystal species formed may be better recognized from the relations between the CaO-SiO_2-P_2O_5 and CaO-Na_2O-P_2O_5 systems. It is concluded that especially in the crystal type of α-$2CaO \cdot SiO_2$ other compounds are readily taken up to form mixed crystals. The research of K. T. Greene, previously cited, showed also that in every technical cement, the included compounds such as Al_2O_3 and Na_2O can affect the kind of crystallization of the calcium silicates.

Table I. Composition of the clinkers studied

	Clinker 1	Clinker 2	
Insoluble residue	0.02	0.10	
SiO_2	18.41	23.16	
TiO_2	0.48	7.67	
Al_2O_3	6.76	7.67	
Fe_2O_3	2.59	3.52	
Mn_2O_3	1.27	0.11	
Total CaO	63.92	63.18	
MgO	4.33	0.71	
SO_3	1.11	0.49	percent $CaSO_4$
Total alkali oxides	0.84	—	
Ignition loss	0.71	0.38	
Calculated content			
C_3S	70	29.1	
C_2S	0	44.5	
C_3A	4.8	8.0	
C_4A_2 (F,Mn)	17.0	15.9	
Alkali sulfate	0.8	—	
$CaSO_4$	1.3	0.5	
$CaTiO_3$	0.8	—	
Free CaO found	0.88	—	
Free CaO calculated	0.4	0.25	
MgO	4.3	0.7	
Ignition loss	0.7	0.4	

In the review of the present knowledge of cement clinker, as given by H. Kuhl,[23] the impression is clear that the various possibilities of mixed crystal formation serve as the key for the understanding of numerous problems of the technical clinker. It is therefore desirable that x-ray spectrograms should be extensively obtained at high temperatures.

Summary

Among the calcium silicates, especially with the orthosilicate $2CaO \cdot SiO_2$, transformations of the different modifications into each other occur, which cannot be obtained by sharp quenching. Therefore, the previous phase diagram must be corrected. X-ray spectrograms obtained at high temperatures are indeed a suitable means for recognition of the compounds actually obtained at these temperatures. The different modifications of $2CaO \cdot SiO_2$ obtained up to 1500 deg. C. are described. Also spectrograms of $3CaO \cdot SiO_2$ have been reproduced up to 1700 deg. C. and also of technical clinkers at 1000 and 1500 deg. C., as well as pure mixtures of di and trisilicates at 20, 1000 and 1500 deg. C.

These x-ray spectrograms permit the determination of mixed crystal formations at high temperatures and permit following their changes during cooling. Since these procedures are very significant as to the properties of the kinds of crystals contained in technical clinkers, new methods have been worked out in this research for further cement development.

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*The authors' thanks are due Dr. Gille for providing them with two suitable clinker samples, together with the chemical analysis and the results of the microscopic observation.

STRAIGHT-LINE SAND AND GRAVEL PLANT

Zanesville Gravel Co.'s new plant at Dresden, Ohio, designed for flexibility in meeting crushed gravel specifications; filter sand and methods of removing flats of special interest

By L. DAVID MINSK

EXPERIENCE GAINED in 38 years of producing sand and gravel has been put to use in the new plant of Zanesville Gravel Co., located in Dresden, Ohio. The design adopted has kept the investment very low while not sacrificing flexibility. J. J. Gorman, president of the company, incorporated many of his ideas in planning the plant, and the engineering, by M. Caldwell of Cantwell Machinery Co., Columbus, Ohio, carried out these specifications. Output is 1000 t.p.d. of gravel and 1000 t.p.d. of concrete sand.

The principal point stressed by Mr. Gorman was separation of sand at the beginning of the processing to conserve on height and to facilitate processing of the gravel through the balance of the plant. Two advantages result: (1) plant height is kept low, and (2) the load in the major portion of the plant is reduced. A rotary scrubber, of oversize capacity for capacity of this plant, was chosen to scrub material completely. The unit installed is a 60-in. x 24-ft. Gruendler scrubber having ¼-in. round holes for ⅔ of the length. It is 15 ft. above the ground, supported by a steel framework.

Further points specified by Mr. Gorman have resulted in economies. The plant is laid out in the form of an L, with shops conveniently placed in the angle close to all production equipment. Pit-run material enters the plant at the end of the short leg of the L and finished products are discharged into bins at the end of the long leg. No return belt was incorporated in the design, thus increasing production and reducing maintenance, the operator's experience has shown. Only two trucks are needed to haul from the pit to the plant. The leg from the truck hopper to the single-deck screen can be reversed (see cut) in the event the deposit is opened on the other side of the plant.

Pit-run material from the receiving hopper is carried to the scrubber screen by a 24-in. x 55-ft. belt conveyor. Speed of rotation of the rotary scrubber is 10 r.p.m. However, it is planned to increase this to 12 r.p.m. to increase gravel production. Wash water from the scrubber drops to the sand recovery unit, a 60-in. x 24-ft. Gruendler sand drag located under the rotary screen. Washed sand is discharged from the drag onto a portable Atlas belt conveyor, 18 in. x 60 ft. which discharges to a stockpile. Sand is left in the stockpile to drain before being placed in a 100-ton capacity truck loading bin. A Model 25 Northwest shovel with ¾-cu. yd. Owens clamshell casts the sand into an arc of stockpiles.

When ample sand has been stockpiled, an Allis-Chalmers SRL sand pump is used in lieu of the sand drag. This pump is rated to pump 1000 g.p.m. (at 10 percent solids). The residue remaining is a fine sand, 100 percent passing 50 mesh, 70 percent passing 80 mesh and 40 percent passing 100 mesh. This system replaces a second crane formerly used for recasting stockpiles, releasing that unit for other work.

Gravel through the rotary screen is carried on a 24-in. x 60-ft. belt conveyor to the crushers. A separation is first made on a 48-in. x 13-ft. single-deck Deister vibrating screen which has 1¼-in. openings. Oversize goes through the crusher circuit and undersize is chuted directly to the belt conveyor feeding the screening plant. The primary crusher is a 30-in. Cedarapids jaw unit, and the secondary is a 10- x 36-in. Stedman impact crusher.

When running both crushers simultaneously the bulk of the material produced is #6 (plus No. 8 minus ½ in.) 40 percent crushed gravel, with lesser amounts of #3 (plus ⅜ in. minus 2 in.) and #4 (plus ⅜ in. minus 1 in.) also coming through. By running the jaw crusher alone a larger amount of #3 and #4 crush-

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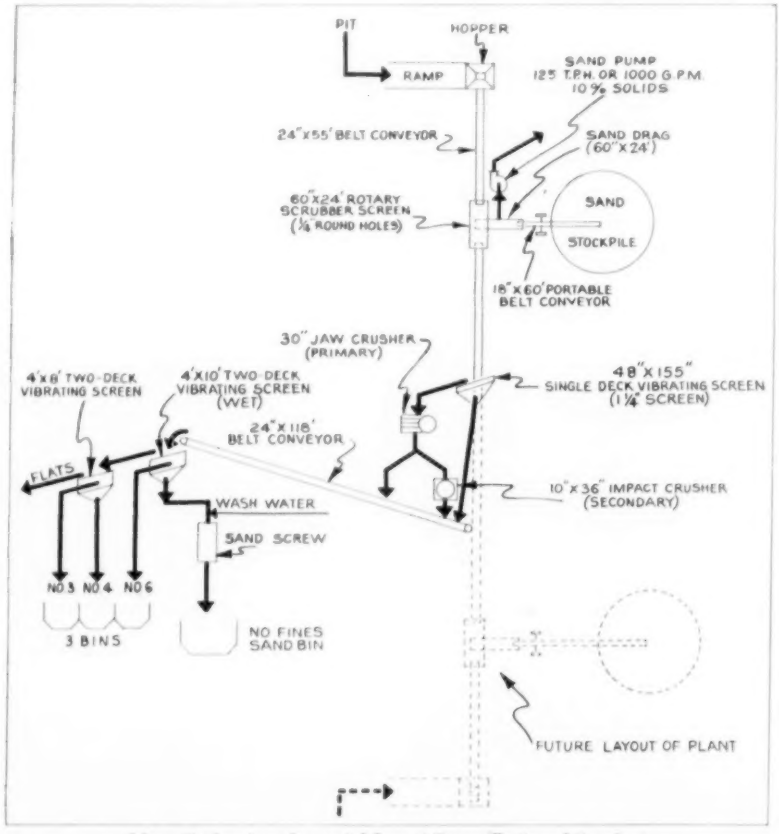
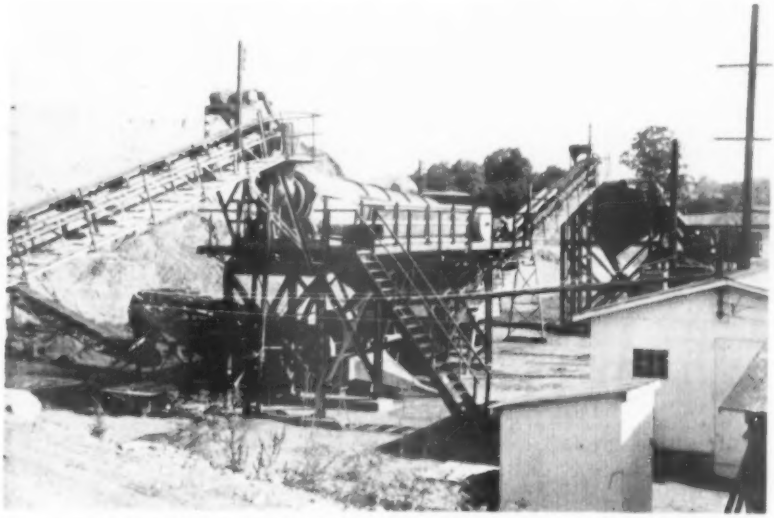


Schematic drawing of material flow at Zanesville Gravel Co. plant

Left: Below the scrubber screen, and on the ground, is a 60-in. x 24-ft. sand drag. Sand is removed at the start of processing. Right: Close-up of the sand drag, showing it discharging material to the 18-in. x 60-ft. portable belt conveyor for stockpiling



Pit-run material is discharged into this 60-in. x 24-ft. rotary scrubber screen for intensive scrubbing and removal of clay and sand

Crushing plant; primary crusher (30-in. jaw) is at base of screen, secondary below it

Rotary scrubber screen in background; note man handpicking shale which has passed screen onto belt conveyor feeding crushing plant

Wet sand from the sand drag is cast in new stockpiles for draining. A 1000 g.p.m. sand pump supplements this method of stockpiling

DETERMINING POROSITY OF REFRACTORY BRICK

By T. YOSHII* AND Y. MURAKAMI*

THE POROSIMETRIC METHOD used for measuring the degree of cement clinker burning (ROCK PRODUCTS, November, 1951, page 88) is also applicable for measuring porosities of kiln-lining brick.

In the usual porosimetric test of fire brick, some of the brick slakes with water during boiling and some material chips off, making an accurate determination difficult. In addition, the test usually requires about 5 to 6 hr. The method suggested here requires only about 2 or 3 min. However, since the sample used is quite small, some experimental error must be allowed. This can be compensated for by additional data from repeated tests, especially since each test can be accomplished rapidly.

Porosities of chamotte brick obtained by the normal immersion method and by porosimeter are compared in Table I. The porosities found by the two methods agree within ± 0.7 percent.

As the sample container (bulb A in Fig. 1) approaches a vacuum, some walls of the closed voids in the fire brick were assumed to be broken by the high internal pressure due to the vacuum and porosities obtained by porosimeter were somewhat greater than those obtained by the normal method. Actually this assumption is not completely valid; there are no completely insulated pores in the fire brick.

Test Procedure

The procedure used in the porosimetric method is as follows.

*Chichibu Cement Co., Ltd., Saitama, Japan.

(1) Using a cylindrical piece of iron the same size as the test specimen of fire brick, determine the effective atmospheric pressure (B in mm. of mercury) and the volume of bulb A (V in mm. of mercury), both for a unit sectional area (nearly 1 sq. cm.) of the buret used.

(2) A sample of fire brick nearly equal to the shape of the bulb (A) is placed in the bulb and the top closed.

(3) After opening stopcocks 1 and 2, the buret is raised until bulb A is overflowing with mercury.

(4) Then shut stopcock 2; the mercury head in the buret is adjusted to the same level with the fixed indicator and graduation a is read on the buret.

(5) Then shut stopcock 1 and open stopcock 2; after adjusting the mercury head in the bulb by lowering the buret so that it comes to the indicator level, read graduations b from the same level on the buret and c of the mercury head in the buret at this time.

(6) Shut stopcock 2, then raise the buret until the mercury head in the buret comes to the same level of the indicator and read graduation d. Stopcock 3 is used only in determining the volume of the bulb.

The porosity of the fire brick is then calculated using the following equation:

$$P\,(\%) = \frac{[B-(b-c)]\,(d-a)}{(b-c)\,[V-(d-a)]} \times 100$$

An example to illustrate the calculations follows; the brick was a Japanese insulating fire brick.

Effective atmospheric pressure $B = 715$ mm.
Volume of bulb A: $V = 315$ mm.
$a = 136$ mm.
$b = 968$ mm. $\quad b - c = 561$ mm.
$c = 407$ mm. $\quad d - a = 229$ mm.
$d = 365$ mm.

$$P = \frac{(715-561)\ 229}{561\ (315-229)} \times 100 = 73 \text{ percent}$$

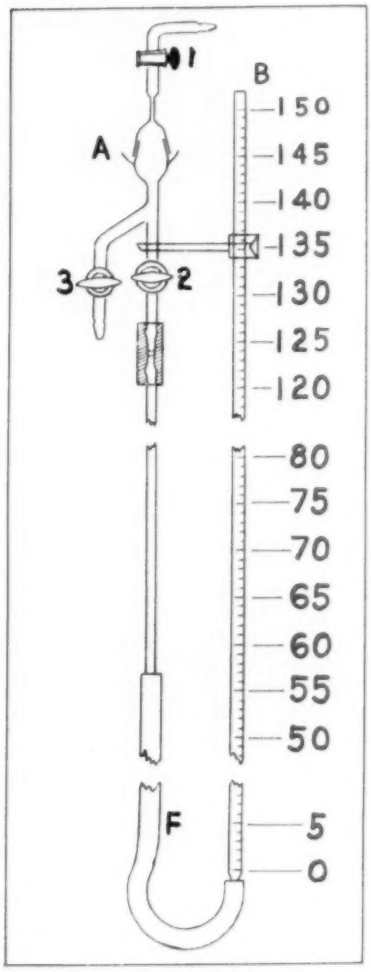


Fig. 1: Apparatus for determining porosity of refractory brick by method described in text

Table I. Comparison of porosities of fire brick obtained by immersion method and by porosimeter

Type of brick	Refractoriness	Porosity, percent		
		By immersion*	By porosimeter†	Difference
Chamotte	38	29.1	28.6	−0.5
Chamotte	37	31.1	31.4	+0.3
Chamotte	35	27.3	27.9	+0.6
Chamotte	34	26.4	26.3	−0.1
Chamotte	32	27.7	27.0	−0.7
Chamotte	35	28.6	27.9	−0.7
Chamotte	34	24.9	25.1	+0.2
Chamotte	32	27.8	27.8	0.0
Chamotte	37	25.5	25.8	+0.3
Chamotte	37	32.9	33.4	+0.5
Chamotte	37	31.3	31.3	0.0
Chamotte	32	25.6	25.7	+0.1
Insulating	—	73.0	73.0	0.0
Insulating	—	67.8	67.1	−0.7
Insulating	28	26.1	26.2	+0.1
Common	—	26.6	26.8	+0.2

*Average of three test pieces.
†Average of five test pieces.

Black Hills Pegmatite

BERYL, lithium, mica, and other essential minerals have been found in commercial quantities in the pegmatites in the Black Hills of South Dakota. Eleven pegmatite exploration contracts involving a total of more than $195,000 have been arranged between the government and mine operators in the search for new reserves of essential minerals in the Black Hills. The government contributed more than $176,000 of the project costs. The government is to be repaid without interest within 10 years if the private operator produces ore, concentrates, or metal from the discovery or development. The pegmatite sometimes contains tantalum, columbium, cassiterite, and lithium minerals.

Crushing Practice and Theory

Part XII. Selecting the primary crusher

By BROWNELL McGREW*

THE TERM "PRIMARY CRUSHER," by definition, might embrace any type and size of crushing machine. The term implies that at least two stages of crushing are involved, but in many cases the machine which performs the function of initial crusher is the only crusher in the plant. The factors influencing the selection of a crusher for this service are much the same, regardless of how many crushing stages there are in the flowsheet; therefore, the term "primary crusher," by common usage, is applied to the crusher which takes up the job of reduction where the blasting operations leave off.

Selecting the right type and size of primary crusher is a problem of prime importance in the designing of a crushing plant of any nature and size. Usually this machine is the largest and most expensive single item of equipment in the plant; a mistake in the choice can only be remedied fully by replacement; and, because the entire primary crusher-house arrangement is generally "tailored" to fit the crusher, such replacement is almost always a costly procedure. While personal favoritism toward some particular type of crusher may safely be allowed to swing a close decision, it should never blind the engineer or operator to the merits of other types, nor to the limitations of his favorite.

The following factors all have a more or less important bearing upon the choice of the primary crusher.

(1) Characteristics of the material.
(2) Average daily, or hourly, capacity required.
(3) Product size, or crusher discharge setting.
(4) Type and size of quarry equipment.
(5) Methods employed in drilling and blasting.
(6) Method of feeding the crusher.

The first three of these factors will almost always be ascertainable at least to a close approximation before the matter of crusher choice is taken up. Sometimes, as when a new crushing plant, or a new primary crusher set-up, is to be installed at an existing operation the last three factors will be pre-established. Otherwise, it is sound practice to consider them as a part of the problem of crusher selection. The primary crushing set-up is closely linked to the quarrying or mining operation, and it is only by careful adjustment of all equipment selections to the general plan of operation that optimum operating results may be realized.

While it is convenient to discuss the influence of these several factors separately, it is well to keep in mind that they are more or less closely interlocked, and that a change in one of them may necessitate altering one or more of the others.

In addition to the factors listed there are usually a few which are peculiar to each individual problem such as labor costs and so on. Any plant design problem is an economic as well as an engineering one. We are concerned here chiefly with the engineering phases.

Characteristics of Material

Characteristics of the material to be crushed include the geological classification of the rock, its physical structure, its chemical analysis (at least so far as abrasive constituents are concerned), and at least a qualitative evaluation of its resistance to crushing—that is, whether soft, medium, hard, or very hard and tough. Frequently such information may be obtained from contiguous deposits which are being operated; sometimes the values must be arrived at by laboratory tests. It is never safe to make blanket assumptions, even on such a material as limestone, which can sometimes prove to be quite tough, as well as to contain significant amounts of abrasive silica.

Physical, or geological, structure of the deposit often has an important bearing upon selection of size or type, or both. If the deposit is thinly stratified, as, for example, many deposits of limestone are, it is safe to assume that the rock can be blasted economically into a condition for feeding a gyratory crusher of medium proportions, or, if other characteristics are suitable, a sledging roll crusher, such as the Fairmount machine. If, on the other hand, the formation is of massive character—as, again, some limestones are—the gyratory crusher might be ruled out in favor of the jaw crusher, unless the operation is of sufficient magnitude to warrant installation of a large size of gyratory. The proposed quarrying or mining procedure will of course have some bearing upon the size of rock to go to the crusher, regardless of its physical structure, as will be pointed out in further detail later on.

If the chemical analysis of the rock discloses that substantial amounts of free silica or any other abrasive are present, crushers of the sledging roll or hammermill types are usually ruled out unless the material is extremely soft and friable. There are occasional "specialty" applications where such machines may be indicated for crushing abrasive materials, but from the standpoint of economical operation their use for such service is rarely justifiable.

The same restriction holds true for hard and tough materials. For such rock or ore our choice of a primary crusher is restricted to the gyratory and jaw types except, again, for the occasional "specialty" application where economy in maintenance may be sacrificed for other considerations such as lower first cost, or space restrictions.

Capacity Factor

The significance of this factor is so obvious that it sometimes does not receive quite as much thought as it should. From the standpoint of minimum requirement, it is of course closely tied up with product size, or crusher setting. But the primary crusher can seldom be chosen solely on the basis of capacity; it should never be selected with a view to just meeting the average capacity required to feed the rest of the crushing plant.

Just how much the rated capacity of the primary crusher (at the required discharge setting) should exceed the average capacity of the plant depends upon how uniformly the crusher will be fed; or to put it more definitely, what percentage of the total operating period the crusher will operate at full rated capacity. The answer to this is not always an

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Typical surge pile at an eastern crushed stone plant

easy one to predetermine, as it may depend upon several details of plant design and quarry operation.

In the average quarry operation, the only surge capacity between the quarry and the primary crusher consists of whatever quantity of rock may be, at the moment, loaded in cars or trucks, and usually this is not large. For that reason, any operating delays occurring in loading, transportation or primary crushing quickly affect all three of them, with the result that the feed to the balance of the crushing plant is cut off until the trouble is rectified. If the plant as a whole is to maintain its rated average output, these departments must be capable of making up for such interruptions, and they can only do this if they have reserve capacity over and above the average requirement.

Such interruptions to continuous production are not uncommon in the primary crusher house; they may assume serious proportions if the crusher receiving opening is not large enough for the material it is expected to handle, and the largest crushers of any type will occasionally bridge or block.

Crusher capacity tables are predicated upon a continuous feed of rock of a size that will readily enter the crushing chamber; it is obvious therefore that a crusher whose rating just equals the average plant requirement would have no reserve to compensate for the conditions we have outlined. For the average quarry operation this reserve should be not less than 25 percent, and preferably about 50 percent.

Plant Reserve Capacity

The suggested reserve capacity for quarry operations applies as well to open-pit mining operations employing power shovels for loading the ore. Usually the primary crusher is expected to produce the required daily tonnage in such plants in one or two shifts, so a time-reserve does exist which can be utilized to make up for delays. But this can only be accomplished by overtime operation of pit, transportation, and primary crusher-house, which under existing labor conditions is a costly expedient. From the standpoint of economical operation, reserve capacity in the primary crusher is just as important here as it is in the commercial crushing plant.

Underground mining operations are, in many cases, provided with a substantial surge capacity between the mine and the primary crushing plant. Furthermore, in medium and large operations of this character, the primary crusher is almost invariably large enough (to meet the required output) so that the mined ore causes little or no trouble due to bridging or blocking. For such operations the reserve may safely be cut to a somewhat narrower margin than we have suggested for the preceding classes of operation. From 10 to 15 percent will usually be safe, if the crushing plant is designed for one-shift operation. Underground mining operations without surge capacity ahead of the primary should be figured for at least 25 percent reserve.

The average gravel plant usually has some surge capacity between the pit and the primary crusher; in many instances, however, this surge is so small that it cannot be counted on to smooth out protracted delays in the pit. On the other hand, primary gravel crushers are not, as a rule, subjected to bridging and blocking, because provisions are easily made to keep oversize boulders out of the system. For gravel operations having little, or no, surge capacity ahead of the primary, a reserve crusher capacity of about 25 percent will usually suffice.

Progressive gravel pit operators are awakening to the importance of providing a large surge pile at some point between the pit and the recrushing, screening, and washing section of the plant. It is not always practicable to place this surge pile ahead of the primary crusher; large boulders cannot be handled economically on field conveyors, nor can they be handled through storage unless large and expensive feeding apparatus is installed. Where the operation involves boulders larger than 12 to 15 in. the primary crusher is almost always installed ahead of the surge pile. This of course calls for reserve crusher capacity, but this is usually taken care of automatically, because a crusher that is large enough to receive these large boulders will generally have plenty of excess capacity to handle the rock component of any gravel deposit. This excess should be not less than 25 percent for such operations. Where the large surge can be located ahead of the primary, a reserve of 10 to 15 percent is sufficient.

It is quite common practice, in some basic products plants, to design the original installation so that it may readily be expanded to take care of anticipated increases in product sales. Such expansion might involve doubling or tripling the initial output. A case in point is the portland cement plant, which is frequently started as a one-kiln plant, but which is usually so arranged that additional kilns, grinding units, and auxiliary apparatus can be installed alongside the original machines. In a plant of this character the primary crusher, and its auxiliaries, are a minor part of the total investment, even as compared to the cost of the original single-unit installation. Furthermore, most cement plants are supplied from open-pit workings, utilizing power shovels for loading the raw materials; hence the primary crusher must usually be of medium-to-large proportions to provide sufficient receiving opening. These facts have led quite logically to the almost universal practice of installing primary crushing departments, in such plants, large enough to take care of ultimate anticipated requirements.

It is not always necessary nor advisable to install a single-unit primary crushing department. Occasionally the required plant capacity is so high that the load can be divided between two primary crushers of ample receiving opening to handle shovel-loaded, quarry-run, or mine-run rock. Some successful high-capacity crushing plants have been built in this manner. In general, the dual primary arrangement is not economically applicable to shovel-loading quarry operations unless the required capacity is in excess of 800 to 1000 t.p.h. For plants above this range the duplicate set-up has some definite

advantages: the two crushers can be set to turn out a smaller product than the one huge machine which would be required for the single-unit installation; trains or trucks can be handled through the crusher house more rapidly because of the duplication of dumping points; and the arrangement has the inherent flexibility, which has long been recognized as being an important and desirable feature in the succeeding stages of the crushing and screening plant.

For plants handling a smaller size of primary feed, for example, gravel plants, and those connected with underground mining operations, the dual, or multiple, unit primary crushing arrangement is more widely applicable, and the advantages are much the same as we have outlined in the preceding paragraph. Probably the most important single advantage is the smaller product obtainable from the smaller primary crushers as opposed to the larger single unit. It is possible in some cases to eliminate one stage of reduction by utilizing such an arrangement.

Product Size

This factor is intimately connected with that of capacity, and it has been discussed to some extent under that heading. Usually the operator wants to get as much reduction as is economically feasible out of his primary crushing stage; therefore, the primary crusher will, more often than not, be set at or near the minimum permissible setting. If his operation involves shovel-loading of quarry-run rock, he will generally want as much receiving opening as he can get for whatever expenditure he feels is justifiable for primary crushing equipment; in the case of the standard gyratory and jaw crushers this means that straight concaves or jaw plates will usually be chosen, and hence the minimum product size must be predicated upon minimum permissible settings with such liners.

There are cases, however, where the choice of a crusher fitted with straight concaves or jaw plates does not work out for the most economical over-all installation. Considering the standard gyratory line as an example—if we compare almost any two contiguous sizes, we find that the larger machine if fitted with nonchoking concaves can be set to a closer discharge opening than can the smaller one when fitted with straight concaves. Also we find that, although there is some sacrifice in receiving opening because of the nonchoking concaves, the larger machine will still exceed the smaller one in this respect. And we find that our larger machine, even at the reduced discharge setting, has a marked advantage in capacity over the smaller crusher with its straight concaves. In certain cases the reduction in size of product obtainable in this fashion may enable the plant designer to eliminate one stage of reduction. Where this can be done, the greater cost of the larger primary crusher will usually be more than offset by the saving in cost of recrushing equipment.

In choosing the setting for a primary crusher it should be borne in mind that it is difficult, if not impossible, to maintain a given setting over a long period of time. This is especially true when the rock is abrasive. Even though the crusher is provided with means for adjusting the discharge opening, it is the exception rather than the rule to find operations where the machine is maintained strictly at any one setting; certainly it cannot be so maintained when the only means of adjustment is to reset or renew concaves. Therefore, when limitations in succeeding units require a certain maximum one-way dimension in the product of the primary crusher, a suitable margin should be allowed when selecting this machine to permit a reasonable amount of wear to take place without exceeding the permissible limit. No fixed rules can be established for this margin. Small machines can be maintained more closely than larger sizes; jaw crushers are easier to adjust than are standard gyratories; abrasive rock demands a greater margin than nonabrasive rock. The advisable margin may run anywhere from ½ to 3 in. or more, depending upon the size and type of crusher, and upon the character of the material.

The succeeding installment shall discuss the relation of the quarry equipment to the selection of the primary crusher.

(To be continued)

A western dam project utilized this hillside surge pile

Quarry Sold

THE BREWSTER QUARRY in North Bergen, N.J., was recently sold to Union Tar and Asphalt Co., Newark, N.J., for $100,000.

Escalator Clauses

NATIONAL SAND AND GRAVEL ASSOCIATION, National Ready-Mixed Concrete Association and National Industrial Sand Association, as an aid to their respective members, have published jointly a 27-page booklet on "How to Write a Cost-of-Living Escalator Clause."

The need for such a publication was recognized after the associations had received numerous requests from member companies to examine their labor agreements, from the standpoint of the law and sound labor-management relations. After examination of these labor agreements, it became apparent to the associations that many companies had already agreed to use the so-called cost-of-living escalator clause in fixing wage rates, and that many others were being pressed by labor unions to do so. Study of existing and proposed cost-of-living agreements led to the conclusion that this problem carried possible danger to the stability of the industries involved so, for the aid and protection of their members, the associations decided to prepare a publication on the cost-of-living escalator clause which would permit members to get a better perspective on how to write such a clause if they came to the conclusion, voluntarily or otherwise, that they must insert an escalator clause in their labor contracts.

The resulting publication was prepared by Herbert Unterberger, consulting labor economist who, on several past occasions, has been retained by the associations to make special studies of various problems arising out of labor-management relationships in these industries.

LIME MEN TALK QUALITY CONTROL

Seventh meeting of Operating Division also discusses kiln operations, blasting, labor relations, safety, and visits Kimballton plant

QUALITY CONTROL and the relationships of management to workers were given special emphasis at the seventh annual meeting of the Operating Division, National Lime Association. The meeting was held September 15-17 at the Mountain Lake Hotel, Mountain Lake, Va., which was selected to permit an inspection tour of the nearby Kimballton lime plant of National Gypsum Co.

Each year it has been the practice to schedule meetings in areas where are located plants which hold interest for the visiting operating men. The Kimballton plant is a rotary kiln operation that is among the most modern in the world. Special features are the high degree of instrumentation of two 8- x 10- x 300-ft. rotary kilns, the material handling, plant design and high calcium limestone mine. The plant produces chemical lime and has not been changed basically since it was completed in 1947. A complete article covering all phases of production was published in the December, 1947, issue of ROCK PRODUCTS, pp. 135-141. A half day was provided for the plant inspection.

Program

The opening meeting was a quality control session under the chairmanship of F. C. Mallery, plant manager, National Gypsum Co., Luckey, Ohio, with the afternoon set aside for a discussion of developments in production. Following the field trip on the second day, an informal panel discussion was held, covering human relations, contract negotiations and accident prevention. The final session, under the chairmanship of Robert S. Boynton, general manager, National Lime Association, heard a discussion of shaped explosive charges and concluded with a discussion of ideas to improve the interchange of information for future meetings.

St. Regis Paper Co. and International Paper Co. each served as host for a cocktail reception, and Fred Chambers, National Gypsum Co., Luckey, Ohio, provided the principal entertainment. Mr. Chambers is an expert magician and he used his talents to advantage in showing how the lime industry could cause many of its operating costs to vanish. Before he got through with his attack on all the items of cost, all that was left as legitimate expenses were the dues and convention expenses associated with the National Lime Association. It was a clever and humorous act that must have taken a tremendous amount of preparation. It was well received.

F. C. Mallery was program chairman and Amos B. Miner, also of National Gypsum Co. (Buffalo, N.Y.) is chairman of the Operating Division. Messrs. Miner, Boynton and Monroe Rule, plant manager, National Gypsum Co., Kimballton, Va., comprised the arrangements committee. M. A. Rikard, vice-president, Southern Cement Co., Birmingham, Ala., was elected chairman for the 1953 program.

Amos B. Miner, in calling the first meeting to order, expressed pleasure in the fact that the operating sessions have been effective in bringing out such a free interchange of ideas among producers who are highly competitive, to the benefit of all. This is growing in importance, he emphasized, since the industry is entering a more competitive stage when customers require higher quality products, which means in his opinion, that production men must become more sales-minded and cost-conscious. He mentioned how requirements for chemical lime continue to become more rigid and present a challenge to production ingenuity.

M. A. Rikard, Southern Cement Co., Birmingham, Ala., was voted program chairman for the next Operating Division meeting

Steam in Calcination

"The Catalytic Role of Steam in Lessening Temperature and Duration of Fluo-Calcinations of Limestone Fines" was the subject of a talk by Prof. W. H. MacIntire of the University of Tennessee. Prof. MacIntire has done research on the use of steam in calcination for many years and holds patents on his process. Back of his early studies was a desire to speed up the reaction rate of dolomite when used in agriculture since dolomite is much less soluble than high calcium limestone.

It had occurred that if the $MgCO_3$ could be concentrated selectively in the form of MgO without change of the $CaCO_3$ to CaO, an objection to the use of dolomite would be overcome.

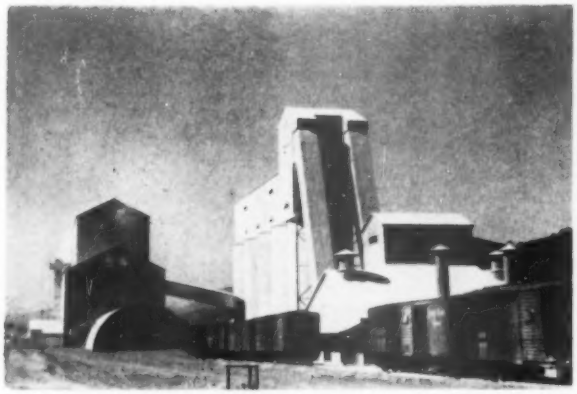
In the laboratory, it has been demonstrated by his work that the introduction of steam into a calciner, a 3- x 20-ft. dryer being used, resulted in a high grade selective calcine (MgO) from the $MgCO_3$ fraction with less than 1 percent free lime (CaO). At 550 deg. C. the breakdown of the carbonate bond occurred and the complete calcination of $MgCO_3$ into MgO took place in the temperature range of 550-600 deg. C. The steam does not just displace gas in the process, but serves as a catalyst. Not only does the introduction of steam result in selective calcination under controlled temperature range but $CaCO_3$ may be calcined at a temperature of 210 deg. C. below the normal when steam is used to displace gas. Figures were presented to show that steam-calcined dolomite has favorable speed of hydration and produces excellent plasticity.

Tests showed that fines of 80 percent minus a 100-mesh sieve were completely calcined in 15 minutes at 600 deg. C.

Heavy-Media Separation

D. M. Kerr, Kaiser Aluminum and Chemical Corp., Salinas, Calif., presented a paper on the heavy-media separation process at his company's plant at Natividad, which is the first application of this beneficiation process in the lime industry to improve quality of product. In this plant the installation was made to reduce the silica content of the stone before calcination.

The heavy media (HMS) installa-



Left: Partial view of the Kimballton plant, showing how lime from kilns is elevated by skip buckets to overhead screws and then into bins. Right: A lot of interest during the field trip was centered in the instrumentation of the Kimballton kilns

tion is at a plant which has three rotary kilns, two of which are 8 x 300 ft. Dead-burned dolomite is processed through a 9-ft. 6-in. x 280-ft. kiln. Products include metallurgical stone, ground stone products, dead-burned dolomite and both hydrated and quick high magnesium lime.

The principle was first described as one where ore or rock is put through a medium of controlled density greater than water, which permits either the sinking or floating of the values. At Natividad the product is heavier than the waste so the separation is made by causing the product to sink.

The preferred medium is a mixture of finely ground magnetite and ferrosilicon which because of its magnetic properties permits ease in recovery and re-use. The loss of medium after washing is very small.

Speaking generally, Mr. Kerr discussed the use of HMS in the metal mining industries and in the coal industry where it permits using mechanized equipment in excavating several seams of coal together. The original separatory vessel was a cone, which is still most widely used, but some newer installations use spirals, drums with lifters, and other devices. Galena was the first media material used, which required froth flotation in recovery for re-use, but the trend is to magnetic materials for ease in the separation of fines and slimes from the media.

At Natividad, the deposit has granite dikes and intrusions interlacing in all directions. The granite is decomposed and practice formerly was to remove the softer granite by dry screening after crushing. This required selective quarrying at the face which was expensive, and as the quarry was extended the granite became less amenable to removal by screening.

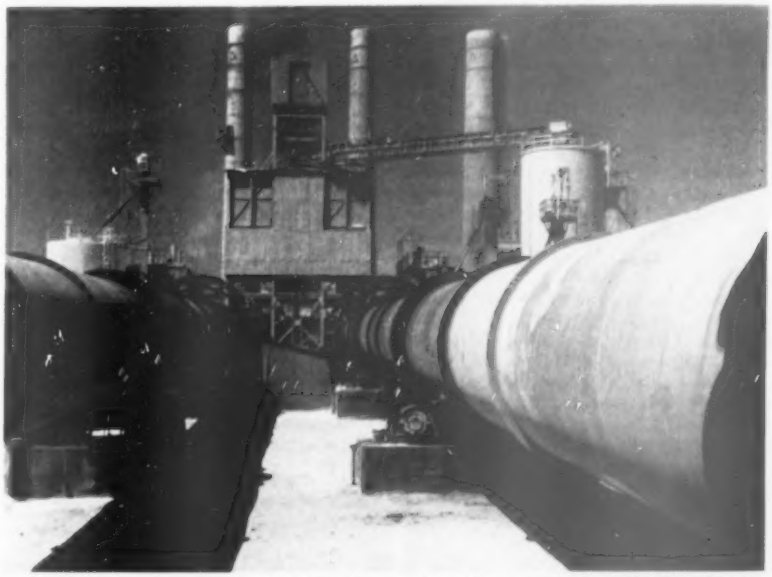
The principal units in the HMS process include a separatory vessel, a pump for circulating the medium, a screw washer for removal of the rock from the medium, a medium recovery system including thickener and magnetic separator, and a densifier to dewater the medium. It is essential to the process that the rock be sized properly and that fines first be removed by washing and screening.

In this flow, stone from ¼- to 4½-in. size is transferred from the trommel-scrubber section by belt conveyor into the HMS cone, into which the heavy medium is pumped. The separation begins when the rock enters the cone. Agitation takes place in the cone and the entire mass is rotated in a clockwise direction. The floats are run off into a launder and the sinks (stone) are brought to the top into another launder for transfer over two sets of 5- x 12-ft. double-deck washing screens in series.

The stone and the waste are both washed over the screens as part of the process for recovery of medium, which drains into a sump. An 8-in. Wemco sand pump, requiring 75 hp. for 1000 g.p.m., recirculates the medium, most of which is applied to the wetting of stone entering the cone while part is diverted to various depths in the cone to modify the density. The control range held in density within the cone is 0.1 specific gravity.

Wash water carrying the medium is put through a thickener, the magnetic material first being magnetized to promote flocculation. A 48-in. Dings magnetic separator then removes slimes. The non-magnetic fraction of the medium is also put through the magnetic separator. Medium is then put through a 48-in. Wemco spiral classifier for dewatering and the solids are returned to the sump for recirculation. Overflow water from the thickener is returned to the washing sprays. An airlift is the control column in the separatory cone, the air requirement being 300 c.f.m. Total connected electric power in motors is 324 hp. exclusive of conveyors.

This installation is comparatively new, having just been completed this year; however, results have proved the process to be practical. Records for the months of June and July in-



Kilns and stacks at the Natividad, Calif., dolomite plant of Kaiser Aluminum & Chemical Corp.

dicate that the density of the float is in the 2.68 to 2.70 range. Density of the medium varies at different levels, a representative range being 2.8-2.73, whereas the range (at the sink level) was 2.75-2.80.

The process is effective in removing R_2O_3 and silica but the main interest is on silica removal. Some comparatively poor rock, of about 4.5 percent silica and even as high as 7.71 percent, has been fed into the HMS circuit, with excellent results. Sinks are being held to less than 1 percent silica whereas the floats, as a result, have ranged from 22.7 to 40 percent silica.

The HMS circuit can be by-passed if desired but by treating all quarry-run stone much that was unusable before is now recovered as high grade material. About 8-10 percent of the feed is lost through the circuit and the costs so far have been "well below 50 cents a ton." As a result of its installation, the life of the quarry has been extended by years and, in Mr. Kerr's opinion, we may expect to see more plants installed soon using this process. In answer to questions, he said that consumption of medium was 0.4 lb. of ferro-silicon and 0.3 lb. of magnetite per ton of finished product. From 140-160 t.p.h. of dolomite is being processed.

Instrumentation

Irving Warner, vice-president, Warner Co., Philadelphia, Penn., in his talk "Instrumentation and Control of Rotary Lime Kilns," gave some practical suggestions on the value and use of instruments. Mr. Warner has made a considerable study of the use of instruments throughout the cement and the lime industries, aside from his personal experience in the Warner Co. plants, so his remarks were based on first-hand knowledge of what is being done and backed by many years of his own experience.

He read a paper on the subject before the 1948 operating meeting and started out his present talk by stating that there have not been any substantial changes in his views since that time. He passed out exhibits to tie in with his paper, consisting of a perspective and prints of the control board for two rotary kilns at the Warner Co. Cedar Hollow plant, Devault, Penn., the smoke detector arrangement in use (see cut), a breakdown of costs of instruments and a sample rotary kiln log sheet in use. Thus, it was easy to follow his discussion of the various instruments.

Since Mr. Warner's earlier paper, No. 2 rotary kiln on high calcium lime at Bellefonte, Penn., has been rebuilt and instrumented, and No. 2 kiln on dolomitic lime at Cedar Hollow has been installed. The control board at that plant for No. 1 kiln has been combined with that for No. 2

Irving Warner, locomotive engineer's cap and all, discusses instrumentation with J. Gilmore Wilson (with that perpetual pipe), both of the Warner Co.

kiln. Functions and values of each instrument were considered.

The three kilns under discussion are fitted with Unax-type coolers. Since the combustion air must be drawn through the coolers against a resistance the end shield must be well-fitted—otherwise, he said, too much tramp air will enter with attendant loss of efficiency, and failure to cool the lime properly would result. As a result, the suction at the end shield is considered an important point of information and must be carefully watched and recorded. The four-point draft gauge in use must be scaled for the normal reading of each point.

All four points on the draft gauge are suction. Suction at the fan is in the 0-4 in. range, and suction in the kiln feed end is in the 0-2 in. range. The difference between these two readings indicates the pressure drop through the nose ring. Mr. Warner's opinion is that the drop through the nose ring is excessive in many cases. He believes that a drop of ½ to 1 in. through the damper is usually sufficient in the average lime kiln. A greater drop consumes excessive power and makes the damper control too delicate for good draft adjustment.

The third draft point measures suction at the end shield which, while it is considered important with Unax-type coolers, is usually unnecessary with other systems. The range at this point should be 0-½ in. The fourth reading is the differential between the suction in the kiln feed end and the suction at the end shield and is in the range of 0-1 in. This reading is the pressure drop through the kiln and is considered of value for quick reference to detect the build-up of scale or other obstruction to the draft.

Whereas a kiln with separate cooler requires only two draft points, external contact preheaters would, as pointed out, require their own instrumentation including draft.

As far as tachometers for kiln speed are concerned, Mr. Warner believes they provide an informative record and are good psychologically from the standpoint of the burners. He briefly mentioned the necessary motor controls, button stations with lights to show that motors are operating, the use of selsyns to operate the damper, etc., and said that ammeters for the drives on the fan, kiln and coal mill are sufficient for installations of this type.

The potentiometer in use is a six-pointer although Mr. Warner still believes, as he has stated before, that four points are sufficient. The necessary four points were listed and discussed. The first is a measure of the gas temperature to the fan. Secondly, a measure of the gas temperature from the kiln before the entry of tramp air or tempering air is desired. This thermocouple should be inserted inside the nose ring and in such a location as to be little affected by tramp air coming down the feed pipe. Then, a true reading of the exit gas temperature is obtained.

The kilns under consideration have dams at the kiln end to retain the lime in the kiln and a reading is desired over the dam. A long thermocouple is placed through the end shield as much as possible over the dam to avoid injury by scale lumps from the dam. While this reading does not predict the condition of the kiln it is believed to give a practical record based upon radiant reflection from the lime and lining and the temperature of the secondary air. This reading does tell the supervisory staff what has happened throughout the 24-hr. period and whether or not the operators have done a good job. Also, it is considered of value in helping to train new men.

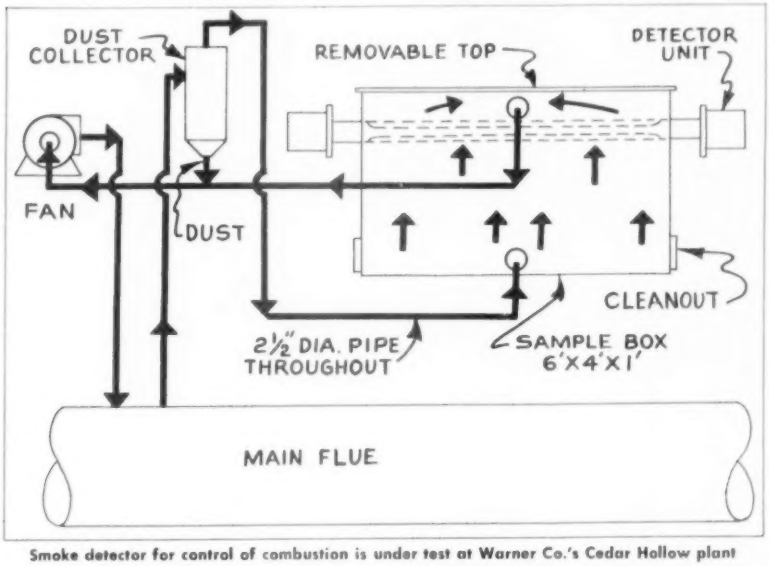
Of course, as he pointed out, any change in the location of this thermocouple requires the determination of a new temperature reading as an indication for the control of quality of lime. Each such installation must be worked out individually as to what is the correct temperature.

The fourth point recommended would be a spare, in this case being used for temperature of the full blast. The fifth point on the potentiometer discussed is a measure of the secondary air from the Unax coolers which is valuable on any type of recuperative cooler. The sixth is not in service. It was originally intended for a thermocouple 135 ft. up the 300-ft. shell, but is not in use because of inability to get sufficient information to justify its maintenance. However the thermocouple was inserted, the record did not show sufficient variation to provide any early information on the kiln condition.

Mr. Warner said that studies of these shell thermocouples at other plants did not reveal any records of value to the operator or supervision, but he is prepared to make such record if it can be shown how to do it to advantage. He believes that there must be a point somewhere up a kiln where information can be gotten that will aid in anticipating underburning or overburning conditions.

As far as the legends of a multiple-point strip potentiometer are concerned, some suggestions were offered. Numbered points are to be avoided. Different marks such as squares, circles and crosses are recommended as is the use of different colors of ink. Black, red and green are the only readily distinguishable colors of ink but it was suggested that a little planning could result in having records in the same general temperature range of color and legend. Wide swings between adjacent readings are to be avoided.

The smoke detector is still under study, the difficulty thusfar being in making the response sensitive enough. A diagram of the installation for testing gases was distributed. Gas is withdrawn from the main flue, passed through an Aerotec dust collector, through the testing box and then to a small fan that energizes the system.



Smoke detector for control of combustion is under test at Warner Co.'s Cedar Hollow plant

Dust from the bottom of the collector returns to the suction flow and final discharge is back to the main flue. The sample is taken off near the kiln.

While this paper was not intended to cover combustion problems, Mr. Warner said that if the kiln gas shows substantially zero oxygen and carbon monoxide the stack will show a slight brown haze which he believes provides solid particles of carbon in the kiln atmosphere for improved radiant heat exchange. He further believes that a smoke detector can be adjusted to show a 50 percent reading when this haze is present. Then, the reading would go down markedly with a clear stack and up with a black smoke condition.

The Radiamatic is directed, preferably, on the bed of lime with care taken that the line of sight does not include the flame, which is a large variable. It was recommended that it be directed as far up the kiln as possible, which distance is necessarily limited by flame interference. The men like the instrument in use because of the large indicating arrow. It has been found that the thermocouple over the dam follows it closely but about ten minutes later, so the Radiamatic is found helpful in anticipating the characteristics of the lime produced.

There are seven panels on the Cedar Hollow board. The clock and telephone occupy the central panel. The telephone is the self-energizing type and has connections to the drive foundation, to the feed end and to the conveyor tunnel beneath the stone storage. Mr. Warner believes that the instrumentation at Cedar Hollow as described is the irreducible minimum for the conditions and that any more instruments would be an unnecessary expense because of cost of maintenance and because too many records become confusing. The board was manufactured by the Falstrom Co., Passaic, N.J. It has a lighted canopy which also protects the board from falling dust.

On the No. 2 kiln at Bellefonte, Penn., the three-panel board has an enclosed back which is supplied filtered air by a blower. Pressure is very slight so not to affect the readings of the draft gauges. At Cedar Hollow the board is in a separate room with plenty of glass to enable seeing the kilns in operation. It is considered highly desirable to protect instruments from dust.

Mr. Warner summed up the problem of instrumentation. He first listed the one or more objectives that should be accomplished in order to justify their use. They should (1) aid in the protection of machinery, (2) be helpful to the operator or at least helpful in training a new man, (3) provide charts for the supervisory forces to see what has happened, and/or (4) provide information for the engineer to study long range changes in operating practice and results.

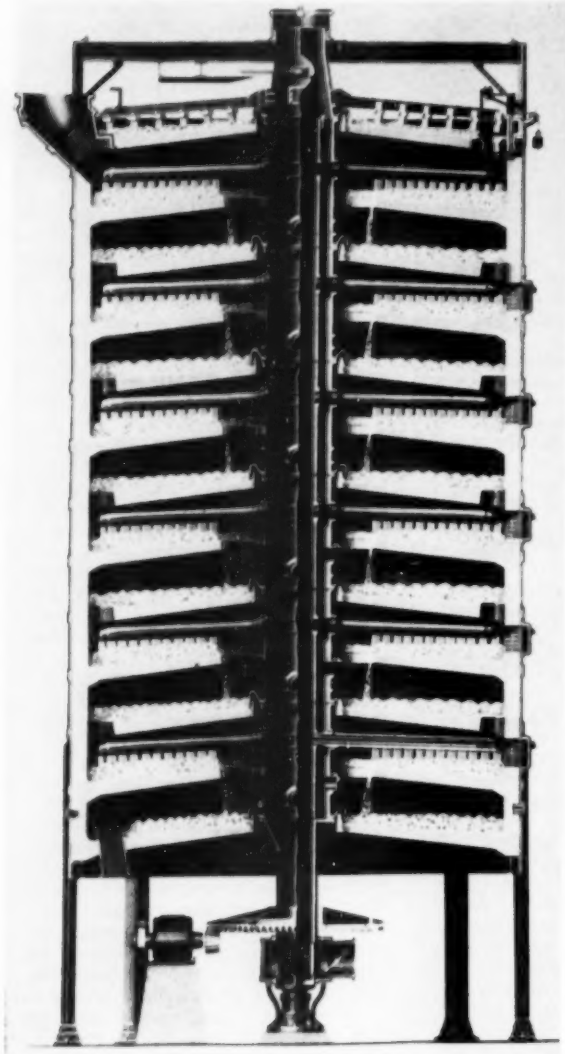
It was recommended that excess instrumentation, which provides data of interest but of no immediate practical value, be avoided. Indicating instruments should be as large as possible, those with round charts and large arrows being considered as excellent. It was emphasized again that strip potentiometers should be limited to four points and that only black, green and red colors be used. Only one kiln should be connected to any one instrument and all the temperatures for any one kiln should be recorded on that chart for ready comparison. Contact coolers and preheaters should have their separate instruments. It is recommended that instruments be placed no lower than 42 in. from the floor and that space be provided for additional instrumentation.

In discussing the log sheet in use, many points of entry are provided that are likewise given on charts, which is done for two reasons. First, it requires the operator to look at his chart in order to make the entry, which is good psychologically. The second reason is to simplify the making of an engineering study of the comparative performance of the kiln over long periods of time.

Mr. Warner made some brief but pointed comments on the control of quality. In his comments on adjustments to the balance between heat input and heat absorbed, he touched upon the good and bad points of the two systems in use, one being constant through-put of charge with variation in heat supply and the other being to hold heat supply constant while varying kiln speed for adjustment. He prefers to hold heat supply constant and to adjust the kiln speed to suit, kiln feed being interlocked with kiln speed. For good variable speed regulation, the direct current motor with variable field control is preferred. Variable voltage on the armature with fixed field excitation would be even better, he said, except that a generator would be required for each kiln.

Mr. Warner is not in favor of the multiple speed induction motor since changes of speed are too great for good calcining technique. This drive, in his opinion, would be satisfactory if practice is to hold kiln speed, and feed rate, constant, but he objects to that practice of kiln operation because of the complications and variations in efforts to hold combustion conditions constant.

Slip ring motors, while not preferred, are in use on the Warner kilns. In the newest installation at Cedar Hollow, a controller with 13 balanced points was installed and performs satisfactorily. The resistors were designed so that the speed steps are small from 0 to No. 5, becoming pro-



Sectional elevation of multiple hearth furnace described as adaptable for calcining dolomite fines

gressively less as No. 5 point is approached. The steps are small from No. 5 to No. 12, averaging less than two kiln revolutions per hour for each step. The last step is large for possible emergency use.

Calcining Dolomitic Fines

The Nichols Herreshoff furnace for the calcination of dolomitic fines was discussed by George E. Connolly, vice-president, Nichols Engineering & Research Corp., New York, N.Y. This funace is a multiple-hearth furnace which has been in use for more than 60 years in other applications and is now being applied in pilot plant work in the calcination of dolomite fines.

Mr. Connolly described construction of the furnace in considerable detail, using as illustration a large reproduction in cross section of a typical furnace, of 21 ft. 6 in. outside diameter, having 12 internal hearths and one exposed top dry hearth. These hearths (see illustration) are for the support of the material being conveyed through the furnace. They are pitched upwardly at their centers and are made of refractory materials, support being their thrust against the cylindrical steel shell.

A 12-hearth furnace as illustrated has six in-feed hearths and six out-feed hearths. On an in-feed hearth, the material is conveyed spirally from the periphery to a large diameter central circular opening through which the material drops to the hearth below. On an out-feed hearth, movement is from the center to the periphery of the hearth where there is a continuous circular row of small drop holes through which the material drops to the hearth below. This alternate arrangement of in-feed and out-feed hearths is repeated until the lowermost out-feed hearth is reached, from which the furnace product discharges through a drop hole.

Capacity is usually proportional to hearth area, the 21 ft. 6 in., 12-hearth furnace having a hearth area of 3000 sq. ft. The gas-bed contact area is, however, 3810 sq. ft. Material is conveyed through the furnace by a "rabbling mechanism" consisting of a central shaft, rabble arms and rabble teeth. A 7½-10-hp. motor rotates the mechanism for a furnace of this size. Construction of the rabbling mechanism and air-cooling system was described. Warm exhaust air is discharged from the top of the central shaft or returned to the furnace for combustion purposes.

The hearth space temperature is limited by construction materials to 1900 deg. F. to 2000 deg. F. which is well above the temperature required for processing dolomite.

For many applications, such as in the roasting of pyrites in the production of sulfuric acid, the process is autogenous but since the early development of this application there have been many new developments.

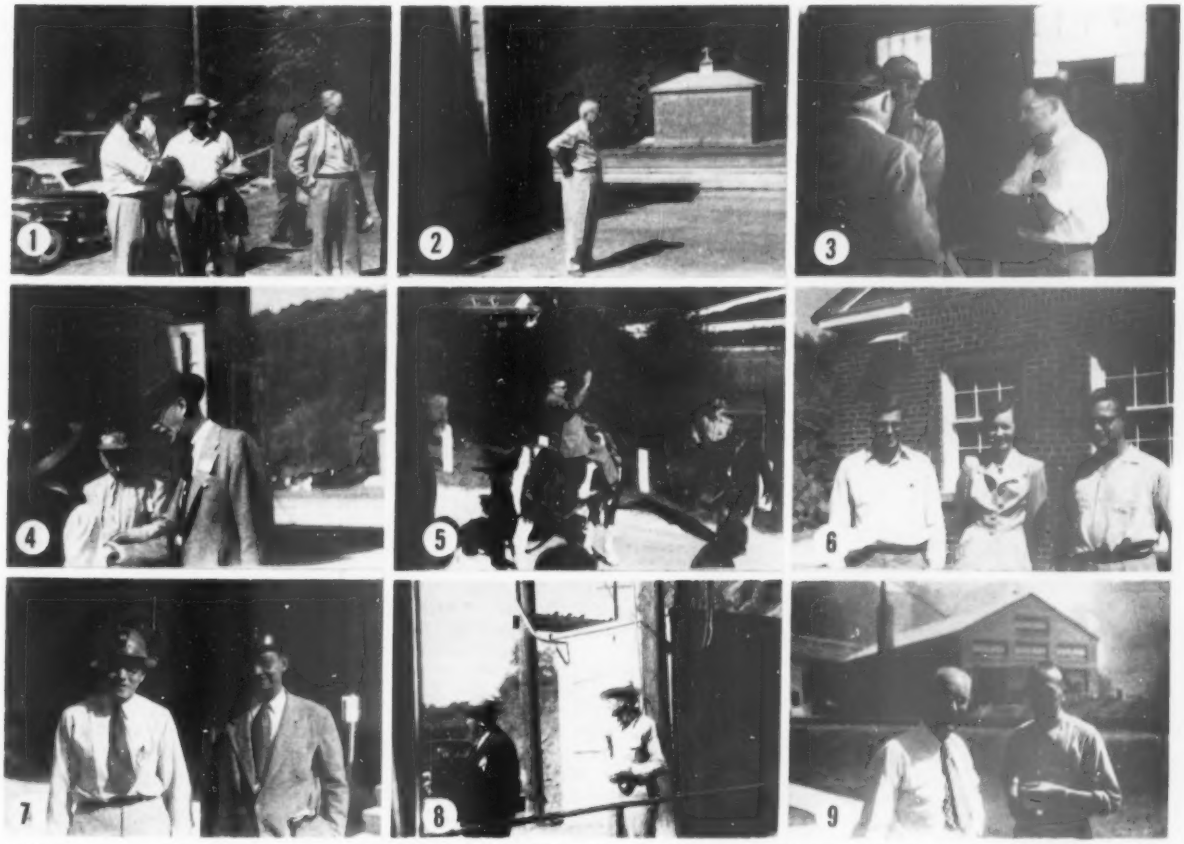
The most common way to supply heat, in the case of fuel oil or gas, is to utilize the hearth spaces as combustion spaces. Openings are provided in the steel shell for the insertion of ignition blocks at selected locations and burners are mounted adjacent to these blocks. The burner flames are entirely within the hearth space area. Usually, the gases ascend through the furnace counter-current to the downward flow of material and discharge through openings in the wall of hearth No. 1 or through openings in the roof arch.

A variety of arrangements is claimed for the furnace. Gases may be caused to flow up, down, partially up or down or crosswise, and they may be withdrawn from any and all hearths and may be recycled in many ways. Fuel and/or feed materials may be introduced at one or more hearths and samples may be concurrently taken at any point in the flow. Dust collector product is returnable to any hearth and a fraction of the product can be recycled completely or partially through the furnace. Other variations were listed to emphasize extraordinary flexibility.

While there is no commercial application, as yet, for the calcination of dolomitic fines the speaker presented pilot plant operating data and results with analogous commercial installations.

Within recent years, a 36-in. I.D., 8-hearth furnace was supplied a concern in Ohio to produce a calcine of characteristics that would permit the separation of magnesia. Later, in cooperation with National Gypsum Co., pilot plant work has been conducted in the calcination of dolomite fines from Luckey, Ohio. Size distribution of these fines was all minus 6 mesh with 3 to 6 percent contained water. The problem was to produce a calcine with an ignition loss of less than 1 percent and to have an acceptable slaking rate, which requirements were accomplished.

In these tests, the feed rate into a small pilot furnace was 1920 lb. per 24 hr. Dust was collected but it was not returned to an intermediate hearth as it would be in a commercial installation. Dust loss was 15¼ percent which was high because of the small diameter furnace and the relatively high gas velocity. The figure for a commercial installation was estimated to be about one-third that much. Temperature in the hearth spaces of the lower three hearths of the 5-hearth furnace ranged from 1700-1900 deg. F., speed of the central shaft was 0.4 r.p.m., and the retention time was about 1½ hr. While no record of fuel consumption was



(1) Part of group waiting for trip through plant. Frank S. White, left, and A. H. Nieman, Ohio Hydrate & Supply Co., visit, while W. J. Barrett waits at right. (2) Prof. W. H. MacIntire of the University of Tennessee was one of the featured speakers. (3) Frank S. White, New England Lime Co., Adams, Mass., (with arms folded) discusses a controversial point with Irving Warner (back to camera) and L. E. Smith of The Kelley Island Lime & Transport Co. (4) Fred Warner seems to be speaking his piece here. (5) Albert W. Busch of The Kelley Island Lime & Transport Co. obliges by posing on an "alleged" saddle horse. (6) The association staff was well represented at the plant inspection; left to right are Kent Jander, Gladys L. McBee and general manager Robert S. Boynton. (7) Monroe Rule, works manager, Kimballton plant, National Gypsum Co., left, personally escorted Dr. A. E. Alvarez Azcue, Butler Engineering Co. of Cuba, Havana, through the plant. Dr. Azcue timed his trip to take in the N.L.A. field trip. (8) C. W. Streit, Jr., left, and M. A. Rickard, both of Southern Cement Co., Birmingham, Ala., look back at something they missed. (9) President Wallace E. Wing, of N.L.A. and Marblehead Lime Co., Chicago, Ill., left, renews acquaintanceship with Sam Snead, who formerly operated Kimballton Lime Co. at site of National Gypsum Co.'s plant

kept for such a small furnace, by calculation based on experience it is estimated that the fuel requirement is equivalent to 6,300,000 B.t.u. per ton of calcine.

An installation for the production of 40 tons of calcines from minus ⅜-in. dolomite, including conveyors, elevators, feeders, dust return screw, blowers and all furnace drives would require 88½ connected horsepower in motors with an average load of 40 kw.-hr. per hr., according to the speaker.

On the basis of a fuel cost equivalent to $.40 per 1,000,000 B.t.u., power cost at $.015 per kw.-hr. and operating labor at $1.67 per hr., the total cost of calcine for a single-furnace 40-ton plant was calculated to be $4.40 per ton including maintenance. For a four-furnace plant producing 160 tons of calcine per day, the total cost would be $3.84 per ton, according to the speaker's calculations.

Some of the analogous installations in operation were mentioned. Four furnaces were installed during the war at Gabbs, Nevada, to calcine flotation magnesite. Also, government plants were equipped with furnaces to calcine precipitated calcium carbonate filter cake. Paper mills have them for the recovery of calcium oxide from filter cake, a beet sugar refinery for the recovery of spent lime sludge, a causticizing plant for calcining lime sludge filter cake. Many other applications were listed.

Electric Screen Heating

Application and the advantages of the Hannon electric screen heater to vibrating screens for the purpose of minimizing blinding was discussed by Don Schulte of Cantwell Machinery Co., Columbus, Ohio. This firm is distributor for the heaters manufactured by F. R. Hannon and Sons.

The "Hanco" heater converts 220, 440 or 550 volt, 50 or 60 cycle current from plant power lines into low-voltage current which is delivered through high-amperage cables and copper distribution bars to the screen cloth. Resistance to the passage of the current causes the screen wires to heat, as a means to prevent moist material from sticking to the screen cloth.

The two causes of screen blinding are slivers and elongated particles in materials being screened, and moist fine particles which become attached to screen wire. Electric screen heating has its application where fine particles cause the difficulty.

Electric screen heating, according to the speaker, had its first application in a clay plant back in 1930. Manner of attachment and distribution for greater utilization of current and for reduced wear from abrasion has been perfected since earlier installations. The new unit is designed so that it is adaptable to practically all woven screens and may be applied to new or existing single or mutiple-deck vibrating screens whether the cloth be of stainless or tempered steel.

Distribution bars are shielded against abrasion and make direct contact with the screen cloth. A quick-change attachment has been devised to facilitate quick cloth changes.

Mr. Schulte listed the names of many rock products producers, including lime manufacturers, who have installed screen heaters since 1949, there being some 400 installations in service. Use ranges from sizes of ⅝ to 4 in. on iron ore to 80-mesh cloth for talc, but most applications are in the 4-12 mesh range. Moisture contents range as high as 24 percent in the case of clay.

Transformers for this service have up to eight variation steps in voltage and the secondary unit is attached to the screen. A light shows if there is a ground and if two lights flash that is the warning to shut down and find the cause for a ground. Output from the transformer, stepped down from the power source, varies up to 14 volts and the amperage range is 0-4000 amperes. The screen cloth is normally heated to about 150 deg. F., which is just sufficient to prevent the first particles from adhering to the cloth. Cost of electricity, assuming a charge of 2 cents per kw-hr., would be about 30 cents per hour to heat the average 4- x 5-ft. vibrating screen.

Advantages claimed include increased production by virtue of greater effective screen area and less down time, increased screen life, the elimination of labor costs for screen cleaning, a lengthened operating season, more accurate screening, the possible elimination of dryers, and the possibility of producing new products in the finer size classifications.

Palletized Loading

In a discussion of palletized loading, W. F. Ackerman, National Gypsum Co., Buffalo, N.Y., not only commented on the value of palletized handling with fork lift trucks but he stressed principally the difficulties and problems involved in gaining full advantage of this method of material handling.

There is a trend to handling packaged products by palletized methods because of increased labor costs, but there are so many variables that adoption of this method is extremely complex. For one thing, customers must be kept satisfied and they must be educated in how to handle palletized products at destination.

From the producer's standpoint, the most effective type of pallet must be established to fit the bags and men must be trained in the de-airing and flattening of bags and in proper piling. Choice of glues is a problem in order to hold pallet loads in place while on railroad cars, the majority of them having the weakness of permitting sidewise motion to cause separation. Cars must also be loaded to prevent shifting of the load and methods of palletizing must be adapted to the kinds of railroad cars available and be loaded solid so as to avoid the need for bracing. The extra cost involved, according to National Gypsum Co.'s experience has been in excess of $1 a ton handled.

The question as to types of pallets to be used is important, there being the problem of pallet return and extra weight involved in outgoing freight. Customer facilities must also be considered in determining the type of pallet to be used. Platform levels must also be determined to take into account differences in height of cars caused by worn-out springs and other variables. The use of palletized handling, while complex, apparently is proving successful.

Safety

An entire session was turned over to a discussion of safety, human relations in industry and contract negotiations, which was unique for operating meetings but very productive judging from audience participation.

First, Lea Warner, Jr., director of safety of the Warner Co., Philadelphia, Penn., was asked to comment on safety and the program of his company. John J. Murdock, in charge of maintenance and safety of the company's Cedar Hollow plant, J. Gilmore Wilson, general superintendent of the eastern division and Fred Warner, general superintendent of the Bellefonte division, followed Lea Warner's opening remarks with a discussion of plant practices.

Lea Warner first discussed the President's Conference on Industrial Safety and its possible effects on the industry. At an earlier meeting, in 1949, he had cautioned that, unless industries improve their safety records, the government might find an opening to step in and dictate industry practices, and the threat has since become worse, according to Mr. Warner. Labor is grasping at weaknesses and, with the federal government's support, there continues to be a real threat.

It was pointed out that the mine safety law has given government the power to close down coal mines and that it would take only a few changes to cover other industries, including lime manufacturers. The coal mining industry became exposed to government regulation because of its poor accident record.

Turning to performance of the lime industry, Mr. Warner said that a frequency rate of 10 or a little more is no longer considered as favorable. While members of the National Lime Association, with some 42 companies enrolled in its safety competition, have frequency records much more favorable than the record for all lime plants, with figures in the twenties as compared to the thirties and even forties for the entire industry, he said, the record still leaves much room for improvement. The success of the portland cement industry in sharply reducing its accident frequency record to about 10 and maintaining it was pointed to as an example of what can be accomplished.

It was emphasized that people, as well as machines, must be considered in a maintenance program and unless that be done an industry is not doing an over-all good job. Top management must be sold on the role of safety in order that a company be successful in reducing accidents. Even the small plant should have an organized safety program which may possibly require that those responsible for maintenance or electrical operations be put in charge.

The Warner Co., among its many approaches to safety, conducts a safety suggestion competition on a regular basis, with cash awards given for winning suggestions every two months. Recognition is given the winners and their suggestions are publicized.

In hiring men, they are placed in jobs according to their physical limitations, if any exist, and a program of periodic training is conducted. Safety posters and other visual means of education are considered excellent. Enforcement of safety rules is the responsibility of supervision.

Frank R. Cadman, also of the Warner Co. commented that a safety program is only as strong as its weakest link. Insofar as responsibility is concerned he said that the family of the deceased or injured often places the burden on his employer, particularly if practices were permitted that might be interpreted as having contributed to the accident.

Lea Warner said that the safety organization is not the same at any two plants of the company. The program at the Bellefonte plant was discussed briefly by Fred Warner. Here there is a mining as well as a plant division and each department has a separate safety committee. A committee of three men, of which one is the foreman, is appointed every three months for each department which conducts its own inspection trips and monthly operations meeting. Each foreman has a monthly departmental meeting and has his own method of presentation. And discussion of safety is considered just as important as any other operational subject. Lea Warner interjected that this plant formerly had an inferior accident record. Weekly meetings were held for awhile to get at the problem and recently the plant had completed 990,000 manhours over a period of a year without lost-time accident.

J. G. Wilson told some of the practices at the Cedar Hollow plant. He pointed out how mechanization can reduce accidents, telling the experience before and after a program of quarry mechanization was completed. When hand sledging was the practice

(Continued on page 100)

QUICK REPAIR OF CRUSHER CRACK

Cold process bonds break without application of heat and without introducing stresses

By C. A. GUSTAFSON*

THROUGH AN UNFORTUNATE series of events, a manganese shovel tooth went into the No. 9 McCully crusher at Callanan Road Improvement Co.'s South Bethlehem, N.Y., plant. The tooth wedged between the chills and the crushing head and caused a rupture in the lower frame. This rupture extended around the entire frame from one side of the discharge chute upward and diagonally to the back of the crusher where it flattened out for approximately 2 ft., and then diagonally downward to the other side of the discharge opening. The crack was approximately 5 in. above the diaphragm or wear plate and approached the contour of it around the frame. This crack, or rather break, was roughly 16 ft. long. The thickness of the metal varied from ⅝ in. where abrasion had taken place, to 3 in. in the back or top of the break.

The plant was only in its third day of operation for the season when this accident occurred. The problem that confronted the company was to get back into operation as quickly as possible due to the large backlog of orders. The manufacturer could only promise a two-month delivery on a new casting. The used crusher market did not turn up a suitable part within a reasonable radius.

Finally, the Metalock Casting Repair Service was contacted and its engineer, A. F. Haggerty, arrived the following afternoon to examine the break and decide whether his company could feasibly repair it. After a superficial examination of the crusher, Mr. Haggerty concluded his company could repair the break and would guarantee the job. He estimated that by working around the clock the repair could be finished in two weeks as a maximum. The quarry officials decided to utilize this repair service and two days afterward the work started. Metalock furnished two men for each 8-hr. shift and Callanan Road Improvement Co. agreed to furnish the same.

The first day only two shifts worked as the third shift was flying in from Wichita, Kan. However, from then on work never ceased until the job was finished. On the sixth day work had progressed to such a point that Metalock agreed to let the crusher operate. They still worked on while the plant was operating. On the tenth day they completed the repair. There is no sign of vibration between parts nor any indication that this frame is any different than before the accident.

Metalock is a cold process to repair broken or crushed castings, shafts, etc. It has proved superior, in our experience, to welding on castings due to the fact no internal stresses are set up due to heating. There are four primary methods of doing this work and the nomenclature of them more or less describes each one. They are called Metalock, Masterlock, Metalace and Interlock. On most jobs a combination of two or more of these methods is used.

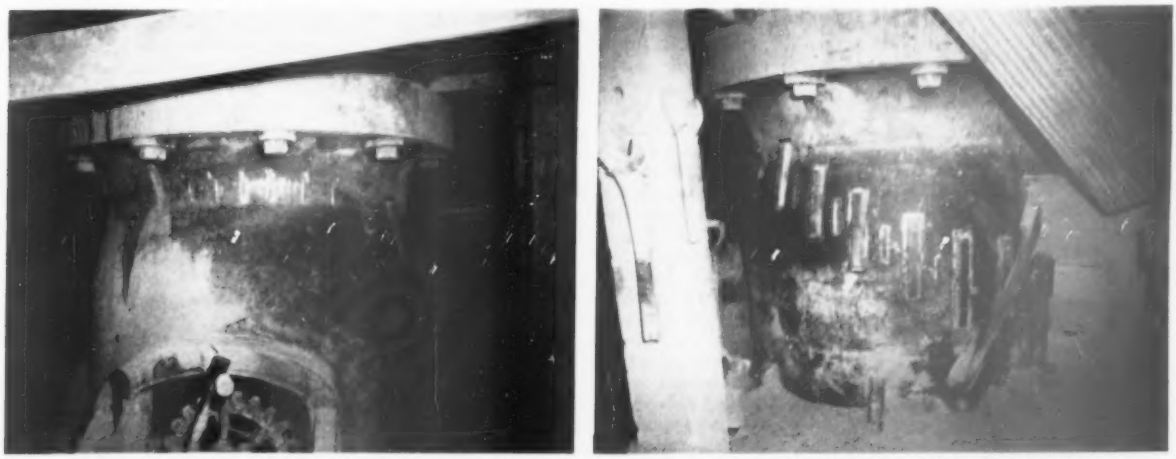
In Metalock a series of holes is drilled across the crack and the metal between holes is broached out. This leaves a scalloped effect. A piece of special alloy material is then placed in the space and cold hammered with an air tool to fill this drilled and broached section. More and more alloy is added and swedged until the space is completely filled. The depth of drilling and broaching depends on the thickness of the parent metal.

In Masterlocking an entire section is drilled and chipped out to a predetermined depth and replaced with a piece of steel. This steel has its edges drilled and cut so that the entire contour of the plate is a continuous series of half holes. This plate is fitted into the cut out section and, using the half holes in the plate as a guide, the casting is drilled to conform. Pins are then driven into these matching half holes. They are then cold hammered and swedged, compressing the cast iron and steel, thus wedging and fixing the plates rigidly to the cast iron directly across the crack. The size of these plates and the thickness used is determined by getting enough tensile strength of steel to equal or better the strength of cast iron at that point. The sum total of these plates should bring back enough strength to equal or better that of the original casting.

Interlock is a variation of Masterlock, inasmuch as it is a Masterlock with holes cut into the plate. The parent metal is cut to conform to the shape of the Interlock. These small "islands" of parent metal left pro-

(Continued on page 110)

*Superintendent, The Callanan Road Improvement Co., South Bethlehem, N.Y.



Side and end views of the 16 ft. long crack in the frame of a No. 9 gyratory crusher, repaired by cold bonding process

Research

"PROSPECTIVE" CHEMISTRY OF CEMENT AND CONCRETE

Part IV. Structural chemistry of aggregates in and out of concrete

By NATHAN C. ROCKWOOD

MINERAL AGGREGATES ARE COMPOSED of "packages" of minerals, generally in crystal form, the crystals being bound together by both chemical and physical bonds. Obviously, except in the case of fairly pure and homogeneous rocks like limestone, dolomite, quartzite, etc., the rock as a whole has no one form of chemical structure. However, since the faces and edges of the crystals have exposed ions, with disposable positive and negative electrical charges, the bonds between adjacent crystals may have some chemical character as ionic bonds, but perhaps in most common rocks the close packing and interlocking of the crystals—a physical bond—is more important in providing strength and rigidity to the rock structure. The durability may or may not be more of a chemical factor.

One is interested in the chemical structure of the components of portland cement clinker because it should provide an explanation of what happens when the reactive molecules of water are introduced, or cement hydrates and hardens. Similarly one is interested in the chemical structure of rock minerals in order to explain their decay or deterioration from exposure and weathering, both when inside and outside of concrete. As would be expected, the chemical reactions of rock fragments are different when exposed separately and when encased in concrete. The cement gel matrix in which the aggregate is encased has free chemical energy and may either deter or hasten chemical reactions, depending on the kind and availability of reacting substances. The aim of course should be to make concrete of cement and aggregates that are at least compatible, which means having a minimum possible reactivity; and where low grade or the more reactive type aggregates must be used, to provide a cement or mortar matrix which will deter chemical reaction with the aggregates, and thus prolong the life of the concrete. In these processes the structural chemistry of all the components of the concrete certainly plays an important part.

For example, it is possible to explain some notorious cases of cement-aggregate reaction in the simplest possible terms; hydrated portland cement is highly alkaline and obviously by all the laws of chemistry should and does react with an acidic type of aggregate, the whole tendency of nature being always to stabilize any composite structure by chemically neutralizing the combination. As long as it is not neutralized it remains relatively unstable. Acidic rocks are those in which silica occurs in a readily reactive form. Opal is reactive because it contains water or hydroxyl ions and is highly porous, hence it has great surface area, including of course the tremendous interior surface area, which is exposed to solutions through its very fine pores. Glassy silicate rocks are reactive because the silica tetrahedra (SiO_4), which in crystalline rocks form the lattices or frameworks, are already disorganized and in a state of strain, which makes the silica more readily dissolved in alkali solutions. There is probably no significant chemical reaction between portland cement containing soluble alkali and a limestone aggregate without too many impurities because the limestone is already basic (alkaline) or neutral in its chemical structure, and there is no necessity, or there are no components present, for further chemical reaction, except possibly the replacement of sodium with calcium.

It is evident, therefore, that adding a pozzolan, which contains active forms of silica in a finely divided state, has the effect of neutralizing the highly alkaline portland cement, and is the more effective the finer it is and the more intimately mixed it is with the cement grains. When we say that we overcome the cement-alkali-aggregate reaction through the use of a pozzolan by distributing the sodium silicate gel that may be formed, instead of concentrating it around a few pieces of reactive aggregate, we are really merely saying that we have made progress toward neutralizing the portland cement with an acidic component. On the other hand when limestone aggregate or pulverized limestone is added to a concrete mix composed wholly or to a large extent of reactive silicate minerals, the effect of the limestone may be to overcome the too acidic character of the mix with an absorbent alkaline material, or to release carbon dioxide from the reaction of limestone and silica in solution in water; and the CO_2 then may "set" the silica gel, since this is a well-known reaction. In any event, some highway pavement experience in western Kansas and Nebraska with reactive silica aggregates shows that the addition of limestone helps stop the reaction, which is said to take place with low alkali cements as well as high alkali cements. In other words there may be slow but continuous reaction between the calcium hydroxide and silica which the calcium carbonate tends to absorb. Similarly, limestone or calcite integrally ground with portland cement seems to produce more stable concrete under some conditions of exposure, apparently where rain, sea or surface water percolating into the concrete is of an acid character. In this case it may be that the crystals of calcite act as nuclei to crystallize the calcium hydroxide in the hydrated cement as carbonate.

It is evident, of course, that while the fundamental reasons for cement-aggregate reactions may be reduced to simple chemical terms of relative alkalinity and acidity, the actual reactions and the resulting products of these reactions may be very complicated, because in any chemical structure a change in environment, that is, a change of the existing conditions of equilibrium in which the atoms and ions are placed, tends to have "chain reactions" throughout the structure. Since a perfectly stable structure can never be attained, the most that we can do is to try to promote conditions or environment to give optimum life to the concrete under the best estimate that can be made of over-all conditions to be expected. Hence, as a part of an over-all control program, engineers are no longer satisfied with mineral aggregates that are clean,

tough and "sound" by previous physical tests, but knowing that the chemical structure of minerals must have some influence on their suitability for concrete aggregate, we are approaching specifications which will attempt to evaluate aggregates on this basis, as we are already trying to evaluate portland cements on their alleged chemical composition. In doing so the greatest danger is that investigators will be so preoccupied with their own developments and theories as to make the problem of durable concrete constantly more complicated instead of progressing toward simplification, which must be the final answer if all this work is to prove of practical value.

Rock Types

Readers of the *Proceedings* of the American Concrete Institute and the American Society for Testing Materials are aware of many recent papers and discussions on the "petrographic" studies of concrete aggregates. Petrography is the microscopic analysis or study of rocks to determine their mineral composition. Petrology is related to the same science but is more comprehensive in that it attempts to explain how these minerals and rocks are formed in nature. The average mineral aggregate producer has perhaps regarded these studies as of some academic interest, but probably does not appreciate that they are actually steps toward specifications and tests which sometime in the future will govern the acceptance of his products for concrete aggregates. Proof of this is Report of Committee C-9 on Concrete and Concrete Aggregates of the A.S.T.M. at the most recent annual convention in New York, June, 1952.

Included in this report are "Proposed Tentative Recommended Practice for Petrographic Examination of Aggregates for Concrete." It contains detailed instructions for skilled petrographers on how to identify and determine the percentages of the chief mineral components of various kinds of rock, sand and gravel. The properties of aggregates to be investigated and recorded are listed as (1) particle shape; (2) particle surface; (3) grain size; (4) texture and structure, including observations of pore space, packing of grains, cementation of grains; (5) color; (6) mineral composition; (7) significant heterogeneities; (8) general physical condition of rock type in the sample, and (9) presence of constituents known to cause deleterious reaction in concrete. That big word "heterogeneities" means the rock's irregular character or mixture of various minerals, being the opposite of homogeneous.

That isn't all, however, for the same report contains "Proposed Tentative Descriptive Nomenclature of Constituents of Natural Mineral Aggregates," in which, as preliminary,

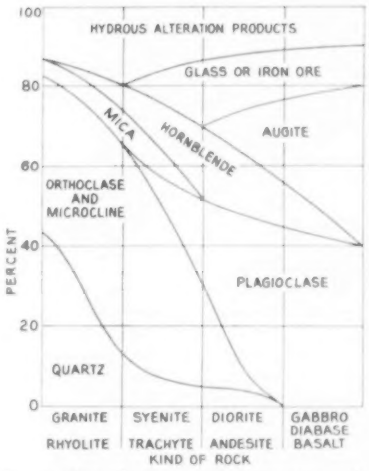


Fig. 1: Mineral composition of igneous rock

it is stated: "Mineral aggregates composed of constituents of any type or combination of types may perform well or poorly in service depending upon the exposure to which they are subjected, the physical and chemical properties of the matrix in which they may be embedded, their physical condition at the time they are used, and upon other factors." The minerals in rocks to be determined, presumably by petrographic analyses, are listed as silica minerals, feldspars, micaceous minerals, carbonate minerals, ferromagnesian minerals, clay minerals, sulfides, iron oxides, and zeolites. The report also contains a brief description of the types of rock which contain these minerals.

Identification

Members of the National Crushed Stone and National Sand and Gravel Associations have also had some inkling of what the trend is because in both instances distribution has been made of a paper by D. O. Woolf, senior materials engineer, U. S. Bureau of Public Roads, entitled "The Identification of Rock Types." This is intended to aid the lay reader in classifying the rock produced in his own operation, or a prospective operation. Fig. 1, taken from this paper, is a simple graphic representation of the principal minerals in igneous rocks. Since sedimentary and metamorphic rocks trace back their origins to igneous rocks, the same minerals are the original building blocks for all kinds of rocks, but solution and metamorphosis may add new ones, particularly by adding hydroxyl and water ions to the grouping.

A glance at the chart (Fig. 1) shows that one can make a quick estimate of the proportions of the principal minerals in nine common types of rock. Thus granite and rhyolite can contain from 10 to 40-odd percent silica with most of the rest orthoclase and microcline; diorite and andesite are mostly plagioclase, hornblende and augite; gabbro, diabase and basalt, mostly plagioclase and augite. Reference to any good text book on mineralogy and crystallography will give some data on the chemical formulas of these minerals; and petrology and geochemistry will provide data on their origins and the ways in which they tend to disintegrate by exposure to the elements in their native state.

Thus far it would appear that only those minerals have been selected for investigation which have been shown may have a deleterious effect when used with certain types of cement. There is every reason to believe that just as wide a field, and perhaps more profitable results, lie in determining aggregates which will have a stabilizing effect on the concrete mix. There are already some data along this line, as we have noted from time to time in these articles. As an example of one simple conclusion, limestone is preferable to avoid deleterious chemical reactions for use with highly alkaline, present-day portland cements, but is inferior to silica or most silicates from a physical viewpoint of strength, hardness and toughness of the concrete.

Structural Chemistry

The chemical formulas of the various minerals are helpful in judging their desirability as constituents of mineral aggregates, but we shall have to go farther than that to understand

Table I. Rock-forming minerals

Primary minerals	
Name	Composition
Quartz	Silicon dioxide
Feldspar: Orthoclase	Silicate of potassium and aluminum
Microcline	Silicate of potassium and aluminum
Plagioclase	Silicate of sodium, calcium, and aluminum
Pyroxene: Augite	Silicate of calcium, iron, magnesium, and aluminum
Amphibole: Hornblende	Complex silicate principally of calcium, iron, magnesium and aluminum
Mica: Muscovite	Hydrous silicate of potassium and aluminum
Biotite	Hydrous silicate of potassium, magnesium, iron, and aluminum
Magnetite	Iron oxide
Rock glass	Variable
Garnet	Silicate of aluminum, iron, and calcium
Olivine	Silicate of magnesium and iron
Secondary minerals	
Name	Composition
Calcite	Calcium carbonate
Dolomite	Calcium and magnesium carbonate
Kaolin	Hydrous silicate of aluminum
Chlorite	Hydrous silicate of iron, magnesium and aluminum
Epidote	Hydrous silicate of calcium, aluminum, and iron
Limonite	Hydrous iron oxide
Opal	Hydrous silicon dioxide

Number of samples tested	Name of rock	Essential mineral composition, percent														
		Quartz	Orthoclase microcline	Plagioclase	Augite	Hornblende	Mica	Calcite	Dolomite	Chlorite	Kaolin	Epidote	Iron ore	Rock glass	Remainder
165	Granite	30	45	(8)			6				(6)				5
51	Biotite granite	27	41	9			11				(7)				5
29	Hornblende granite	23	34	12		13	4				(10)				4
23	Augite syenite	(4)	52	7	8		4			(3)	(11)	(3)	(4)		4
75	Diorite	8	7	30		27	(4)			(3)	(8)	(5)	(3)		5
50	Gabbro			44	28	9				(3)	(6)				10
43	Rhyolite	32	45	(3)			(5)			(4)	(3)		(4)		4
6	Trachyte	(3)	42			6		(3)		(3)	(14)	(8)	(7)	9	5
67	Andesite			48	14	3				(6)		(3)	(8)	12	6
70	Basalt			36	35								(3)	21	5
196	Altered basalt			32	31					(9)	(4)		(4)	12	8
29	Diabase			44	46								(4)		6
231	Altered diabase			35	26					(15)	(9)		(4)		11
875	Limestone	(6)						83	8						3
331	Dolomite	(5)						11	82						2
109	Sandstone	79	(5)								(4)		(9)		3
191	Feldspathic sandstone	35	26					(3)		(3)	(22)		(4)		7
53	Calcareous sandstone	46	(3)					42					(3)		6
62	Chert	93					(Opal 3)								4
107	Granite gneiss	37	35	(3)			18								7
62	Biotite gneiss	31	35	(5)			21								8
18	Hornblende gneiss	10	16	15	(3)	45	(4)								7
42	Mica schist	37	16				38								9
17	Biotite schist	34	13	(3)			41								9
23	Chlorite schist	11		10		(5)				39		28	(4)		3
68	Hornblende schist	10	(3)	12		61						(7)			7
22	Amphibolite	(3)		8		70						12			7
71	Slate	29	(4)				55						(5)		7
61	Quartzite	84	(3)				(4)								9
22	Feldspathic quartzite	46	27				(7)			(3)	(10)				7
11	Pyroxene quartzite	29	19	15	24			(Garnet 3)					(5)		5
61	Marble	(3)						96							1

Table II. Composition of rocks. (Values shown in parentheses indicate minerals other than those essential for the classification of the rock)

why and how they react under any given set of conditions. Since the science of structural inorganic chemistry is as yet really only beginning, even very few mineralogists and petrographers have obtained a working knowledge so far as concrete aggregates and concrete are concerned. More practice of the science has been done in the case of the glass and ceramic industries, and in the synthesis of gem stones and quartz crystals for industrial uses. Since silica and the silicates represent such a large percentage of the earth's crust, they are receiving a good deal of attention in the study of inorganic chemistry.

Common Minerals

There are over a thousand minerals but those deemed most important to an investigation of mineral aggregates are listed in the paper by Woolf in the accompanying table. The average percentages of these minerals in common rocks, from the same paper, are also shown. The chemical structures of some of these minerals are known, or at least representative lattices have been conceived. It will be noticed that nearly all are complex silicates, and a good deal is known about silicate lattices in general. As we have noted before it is actually a kind of silicate lattice that holds the crust of the earth intact. This simplifies the problem to a considerable extent because silica never occurs as an oxide except in tetrahedron form, as we described in the August installment (Part II) of this series. These tetrahedra are joined together in chains, rings of different sizes, in sheets, in double chains, in ring chains, and in three-dimensional lattices as in quartz. In no instance, however, is more than one oxygen ion common to two adjoining tetrahedra, although each tetrahedron may be joined to 2, 3 or 4 adjacent tetrahedra through different common O ions.

In another installment we shall describe some of these minerals so far as their structures appear to be known, and it will be obvious why some are bad actors in concrete.

(To be continued)

New Asbestos Mine

JOHNS-MANVILLE CORP., New York, N.Y., which operates two asbestos mines in Canada, one of them the world's largest, recently announced plans for the development of a third asbestos mine on ore properties located at Mashaba in the Victoria District of Southern Rhodesia, approximately 200 miles south of Salisbury and 120 miles east of Bulawayo.

Plans call for the development of the asbestos ore properties of Rhodesian Asbestos Ltd., and construction of a processing plant. Rhodesian Asbestos Ltd. was formed in December, 1951, and is under the direction of Canadian Johns-Manville Co., Ltd., a subsidiary of the American corporation, in association with British Metals Corp., Ltd., Anglo-Huronian Ltd., Southern Minerals & Marketing Corp., Ltd., and the Simon I. Patino interests.

James Robert Ewing, mining engineer, formerly associated with Southern Minerals & Marketing Corp. of Southern Rhodesia, has been appointed manager for the new mine.

Universal Atlas Expansion

UNIVERSAL ATLAS CEMENT CO., New York, N.Y., has announced plans for the modernization of its Universal, Penn., plant. The modernization program calls for the replacement of three departments: (1) raw material storage and grinding; (2) kilns; and (3) cement grinding. To provide for continuous production during construction, the departmental replacements will be undertaken in three separate stages. The first stage, on which engineering work has begun and for which equipment is being ordered, consists of the installation of covered raw material storage served by an 80-ft. span bridge crane, three rotary dryers, and two grinding mill units.

The raw materials at this plant contain moisture to an extent that drying is necessary before grinding. After completion of the installation of rotary kilns, or second stage, the waste gases from the kilns will be used to dry these materials. In the interim, pulverized coal will be burned for drying. All dry material bins and machinery in the raw grinding department will be vented to cloth-filter dust collectors. Dust in the gases from the dryers, which after completion of the second stage will consist of the kiln waste gases, will be collected by mechanical dust collectors followed by electrical precipitators.

It is anticipated that the first stage of the modernization program will be in operation the latter part of 1953, or early 1954; construction of the second stage will follow closely thereafter.

CURRENT PROBLEMS OF SAND, GRAVEL AND READY-MIXED CONCRETE PRODUCERS

Associations' boards of directors hold semi-annual meeting

BEGINNING SEPTEMBER 28, 1952, the annual fall meetings of the boards of directors of the National Sand and Gravel and the National Ready Mixed Concrete Associations were held at the New Ocean House, Swampscott, Mass. This was the first time several members and their families had visited New England. Fortunately, the entire four days, (September 28-October 1) were fine examples of the best weather conditions one can expect at this season of the year on the Massachusetts coast. Several members continued their explorations of New England following the meetings.

Ready-Mixed Concrete

The first session on Monday morning, September 29, was devoted to problems of the ready-mixed concrete industry. After a few brief, introductory remarks by president Richard K. Humphries, San Francisco, Calif., chairman of the board, the financial status of the association was reported to be in a very prosperous condition; there is an all-time high active membership of 550 concrete producers, some 34 new members having joined since the February annual convention. While this figure represents a very considerable percentage of total national production, there are still many producers throughout the country who could well afford to become members, since few if any other industrial associations render their members better or more complete service on all the numerous problems which beset industry today.

Progress was reported on the group insurance plan for industry producers, and it is hoped to get it in operation soon, which requires coverage of 600 employes. The John Hancock Insurance Co. has worked out all the details, and officials of the company present at this session cleared up several points not fully understood previously. For example, if the producer is also in the sand and gravel, crushed stone, or some other allied industry such as concrete products, he can bring all his employes in these branches in under the one plan. One obstacle to adoption of the plan by some producers seems to be the insistence of the Teamsters' Union on adoption of their own insurance plan, which is not as good coverage for the driver employes since manipulation of the funds is left in the hands of union officials.

The matter of federal price control is still a sore issue, since in such a local, competitive industry there appears little is gained by the public in such control. Moreover, cost items have been constantly increasing without compensatory price increases. It was reported that the new head of the construction materials division of O.P.S. was not inclined to release any construction material from price control. The board, after considerable discussion, passed unanimously a resolution to the effect that no public service was being rendered by further attempts at price control in this industry, and asking for relief.

The association had made formal application for exemption from contract renegotiation, required of government war contractors. Here again no useful purpose was rendered by the requirement. Mineral aggregates had already been exempted. Favorable action had been taken on the National Ready Mixed Concrete Association's application just before this meeting. The status of all these matters and future steps contemplated were explained by executive secretary V. P. Ahearn.

A. R. Shiely, president of National Sand and Gravel Association

Engineering and Research

Stanton Walker, director of engineering, devoted most of his time to a discussion of truck mixer tests which the association has been conducting with the cooperation of the Truck Mixer Manufacturers' Bureau. The tests have been entirely Mr. Walker's responsibility, but half of the expense incurred has been met by the truck mixer manufacturers. While no details are available at this time, Mr. Walker said these tests were something never before attempted, and from them a great deal would be learned about truck mixer performance under a variety of operating conditions. He said much of the data would appear eventually in a paper that he would present before the American Concrete Institute, but that he would issue progress reports from time to time in the interim.

The truck mixers tested were selected by the association from its own members' fleets. All batches were received dry and the mixing done at the job site. Samples of mixed concrete were taken from different parts of the discharge and submitted to all the various tests usual in concrete construction to determine quality. Some of the variables in mixer performance that it was determined to find answers for, were the effects of r.p.m., the total number of revolutions, limiting capacity of the mixer, etc.

Mr. Walker gave rough answers to some of these. For example, he said slow mixing appeared to be just as efficient as a faster r.p.m., so long as the time element factor did not enter the picture; there is, however, a maximum speed which should not be exceeded. He said there was no mixer out of which the testing crew was not able to get good concrete, but some adjustments were required in the case of some mixers. He said that present rated limiting capacities for truck mixers appeared to be conservative; that a 10 percent overload was in effect no overload at all. Mr. Walker said further that his group had now learned how to test any mixer, and said he would propose a permanent testing station to try out new types or designs. He would also like to test the mixers with other kinds of aggregates than the sand and gravel used in these tests.

The results of the annual safety contest were announced, unofficially, since the official results will come later. Executive secretary Ahearn said that interest in the contest was growing, but still only 177 producers had entered the contest in 1952, which however was the largest number yet. The trophies, provided by *Pit and Quarry*, will be presented at the annual convention in San Francisco next winter. Special mention was made of another contest, that of the

Los Angeles, Calif., metropolitan area, open to all truck operators, which was won by a director of the National Sand and Gravel Association, Harold E. Bender, Azusa Rock and Sand Co. His record for safety was applauded as most extraordinary. In the general discussion, the opinion was expressed that in computing hours of exposure only truck drivers and plant operating personnel should be included, leaving out office and executive employes. The rules on this point have not been clear.

Mr. Ahearn expressed the opinion that many ready-mixed concrete producers still do not keep accurate cost records, and it was proposed that the association proceed with a program for expanding uniform cost accounting procedures begun in an elementary way a number of years ago.

In conclusion, resolutions were adopted thanking William Moore, J. P. O'Connell Co., Boston, past president, for his organization of this Swampscott meeting; and one expressing to the family of the late Don Reynolds, of the Boston Sand and Gravel Co., a director, the condolences of the board over his untimely death something over a year ago. The list of directors present is given at the end of this report along with that of the National Sand and Gravel Association.

Sand and Gravel

The board of directors of the National Sand and Gravel Association met on the afternoon of September 29, with Albert R. Shiely, St. Paul, Minn., president and presiding chairman. After the usual introductory remarks, executive secretary Ahearn announced the addition of ten new active members of the association since the convention in Chicago last winter. The total active membership is now something over 280 producing companies. The financial success of the association is outstanding, since there has been a steady and growing annual surplus each year for many years. A part of this is being set aside for payment of pensions to the executives and staff of the association.

J. Rutledge Hill, Dallas, Texas, past president, and chairman of the association's committee on percentage depletion allowance, spoke in favor of continuing the fight for a 15 percent depletion write-off instead of the present 5 percent. Later there was a meeting for all those wishing to find out more details of the U.S. Treasury rulings on depletion allowance. Mr. Ahearn said that new regulations affecting the sand and gravel industry were being prepared. From the trend of the discussion there seemed to be a belief that the new regulations would attempt to establish the end use of the mineral in determining, for example, whether limestone used for aggregate was entitled to 15 percent or 5 percent.

R. D. Ketner, chairman of the

R. K. Humphries, president of National Ready Mixed Concrete Association

Manufacturers Division, spoke mainly on the subject of what has been called "organized entertainment" by equipment manufacturer representatives at conventions. He thought it was time to reappraise the problem, with the possible objective of letting the Manufacturers Division do its own policing. There seems to be a difference of opinion of what constitutes objectionable entertainment, and what is legitimate between a manufacturer or seller and his client or prospective customer. Mr. Ketner also brought up the subject dear to the heart of nearly all exhibitors of the possibility of combining the National Sand and Gravel Association and the National Crushed Stone Association exhibits.

Following the example of the board of the National Ready Mixed Concrete Association, the sand and gravel board also adopted unanimously a resolution requesting suspension of sand and gravel price control. Mr. Ahearn explained that the processing for a suspension of control involved less red tape than a request for decontrol. From the discussion it appeared quite evident that price relief on a nation-wide scale is imperative. An instance was given of one producer whose expense of operating trucks had increased $800 per year per truck over the previous year—an example of cost increase in transportation alone.

Engineering—Research

Stanton Walker, director of engineering, reported at some length on the progress of the American Society for Testing Materials Committee C-9 in writing new specifications for aggregates. He warned that these specifications might make some presently worked deposits obsolete. While the U.S. Army Corps of Engineers has had a large influence in writing these new specifications, apparently the much discussed "thermal incompatibility" of aggregates will not appear in these specifications. However, as we have mentioned in an article elsewhere in this issue, aggregates likely to react with high-alkali cements will be covered in the proposed specification. Mr. Walker explained the difficulties in trying to write specifications for sand and gravel specific enough to be of any value, yet broad enough to cover all sources of supply in such a large country as ours. It is the intention to provide in some way for regional variations. In any event, he thought the new specifications would be an improvement over some present ones.

On the subject of bituminous pavement mixtures Mr. Walker again emphasized that the stability of bituminous sand and gravel mixtures is wholly a matter of the proper gradation of aggregate sizes. The problem of the stripping of siliceous aggregates he said he believed would be solved by additions of certain chemicals to the asphalt, rather than by treating the aggregates.

Specifications are tending to closer grading, particularly in the case of sand. Mr. Walker said that if it is possible the producer should do something about rounding out the grading—supply missing fractions. It was suggested that some producers had been quite successful in crushing grits and coarse sand to finer sizes to supply missing fractions. To remove deleterious particles from both sand and gravel, some progress is being made with heavy-media separation devices. Mr. Walker thought the process was becoming practicable for this industry. Discussion brought out that it cost one producer about 25¢ per ton to reduce pea gravel to sand.

Other Industry Problems

Executive secretary Ahearn carried on from here. The industry at his request has been exempted from renegotiation of contracts. On the subject of more accurate cost accounting for the average producer, he proposed, as at the ready-mixed concrete board meeting, that the elementary work done by the association some years back be expanded and procedures developed in more detail. Mr. Ahearn could see little prospect of improvement in the railway car situation in the foreseeable future. He thought that except for certain fortunate regions there would be a critical car shortage for several years. Moreover, the increased movement of iron ores from ports where they are received and from the mines in Minnesota and Michigan, because of last summer's shipping tie-up, would aggravate an already bad situation.

The results of the association's safety contest were announced in the October issue of ROCK PRODUCTS. The trophies, which are reinforced concrete plaques in color provided by ROCK PRODUCTS, will be awarded at the annual convention in San Francisco next winter. Special mention was made of the Warner Co., Philadelphia, Penn., which succeeds in winning a trophy about every year, although it ranks way near the top in man-hours of exposure. More or less associated

with safety is the problem of stream pollution, zoning ordinances and land rehabilitation. Mr. Ahearn merely reminded his listeners that this was constantly becoming a more important factor in industry operation—one that the industry must always keep in mind.

Joint Meeting of Boards

A considerable part of the joint session of the two boards was devoted to discussion of plans for the next two annual conventions. The one in 1953 at San Francisco involves extensive preparations for a special train from Chicago to the coast, with stopovers at Grand Canyon and Yellowstone Park. From San Francisco special trips can be made to Honolulu, and various ways may be used to return home from San Francisco. At San Francisco, the Fairmont Hotel will be the association's headquarters, but because of the limited number of rooms made available for the convention, reservations at this particular hotel will be confined to officers, directors and staff members of the two associations. There are, however, many rooms available at first-class hotels in the immediate vicinity.

Various suggestions for handling the Manufacturers Division part in the convention were discussed. It is probable that a "hospitality room" will be provided at the Fairmont where the manufacturers may meet and entertain their guests, to take the place of the usual manufacturers' reception and cocktail party. There was some discussion as to whether it would be desirable to have all the manufacturers' representatives housed in one hotel where producers could readily find them for consultation. It was decided that as fast as the manufacturers registered at association headquarters a bulletin would be posted for the benefit of any one who might want to look them up at their various hotels.

The entertainment program includes many interesting trips about the city for the ladies and trips to two of the large gravel plants for the members. Following the convention there will be tours to other interesting places in California. As has been the practice for several years there will be no formal banquet, and few outside speakers at any one of the sessions. The industry has developed, under executive secretary Ahearn, a wealth of "home talent," and repeated soundings of convention sentiment have proved that it is the opportunity to hear and learn from the operators themselves that draws attendance to these conventions.

Mr. Ahearn brought up the problem raised by the Federal Communications Commission's recently issued regulations restricting the commercial use of two-way local radio communication as now practiced by several producers. He thought that in districts of less than 250,000 population industry producers would have no difficulties, but in larger districts there was trouble in prospect because of the preference to be given public utilities. The board authorized Mr. Ahearn to act in the name of the association to present the established rights of present users and to act in cases of applications of members for new licenses.

Future Exhibits

The 1954 convention will be held at the Conrad Hilton Hotel in Chicago, where the 1952 convention and exhibit were held. Mr. Ahearn said there would be more exhibit space than in 1952 because the hotel management has agreed to devote the space occupied now by the coffee shop to exhibit space. It was suggested that the exhibit open a little earlier and stay open a little later than in 1952. One member suggested that the exhibit stay open at least one full evening. Representatives of the Manufacturers Division assured the board that they were sure the exhibitors would stay on the job as long as the operators desired them to do so.

Engineering Activities

Stanton Walker reviewed briefly his routine work as a member of various engineering and research committees. He also referred to the various regional meetings of producers under the auspices of the associations, and the association's short course in concrete technology at the University of Maryland, which has proved a great success. He has also lectured to classes at various other college conferences. Mr. Walker said the association's publications were in need of reprinting and revision, since there is a steady demand for them. At this session Miles N. Clair, president of the Thompson Lichtner Co., Boston, Mass. concrete specialists, was introduced and discussed concrete research in general.

Federal Legislation

Executive secretary Ahearn referred to the proposed legislation on returning the offshore tide lands with their oil deposits to their original state ownership and a resolution proposed by Robert Mitchell, of Los Angeles, was unanimously adopted. The point of view of the association is expressed in the three following paragraphs of the resolution:

"Whereas, this problem is not limited nor does it affect only states bordering on the seas but can and may affect every property interest in the United States, even including rock, sand, and gravel deposits which by their very nature can readily be deemed to be essential to the defense of the country and therefore subject to seizure without compensation by the Federal Government under some self-created emergency, and

"Whereas, in the absence of 'Congressional surrender of title or interests' in these lands, the power will remain in the Federal Government to do as its whim and caprice—or political friends—dictate with respect to rights which have always been heretofore protected against such encroachment, and

"Whereas, once power is obtained by any government over any matter it is never relinquished nor self-limited, but is expanded as is best evidenced by the Fallbrook, California, water controversy and by the seizure of the steel companies."

Area Labor Bargaining

The matter of pending legislation which would prohibit nation-wide, union-labor bargaining was brought up. Directors from the West Coast, in particular, were much against any legislation that would include area-wide bargaining, which has worked out very satisfactorily in San Francisco and Los Angeles, where all the area producers deal with the unions as a unit. A resolution to that effect was subsequently unanimously adopted. It was said that the National Association of Manufacturers was pushing for passage of a bill so broad in its terms that such area bargaining might be included.

The problem of what labor is included in new interpretations of the Wage and Hour Laws, Mr. Ahearn said, was again a hot issue. Two cases are now pending before Circuit Courts of Appeal, in which employes engaged in production of aggregates for local use are involved. To meet any situation which might arise of critical importance to the industry, a resolution was adopted authorizing the Association to intervene in cases where its legal counsel recommends it.

The final order of business was consideration of what part the member companies might play in the promotion of more adequate highways. H. V. Owens, past president, Utica, N.Y., described the work in his state of Project Adequate Roads, known as P.A.R. These are local organizations of all interested parties, designed primarily to serve the public interest. Their promotional activities take into consideration local problems and issues and are much more effective than any nationally directed program, but are more or less linked to National Highway Users Conference.

Registration

The combined registration including guests, was as follows:

Robert H. Baker, Chattanooga, Tenn.
Robert S. Barneyback and Mrs. Barneyback, Oakland, Calif.
C. A. Barinowski and Mrs. Barinowski, Birmingham, Ala.
Fred E. Bellamy and Mrs. Bellamy, Cedar Rapids, Iowa
Harry E. Bender and Mrs. Bender, Azusa, Calif.
Daniel J. Boylan, Boston, Mass.
E. F. Brovelli and Mrs. Brovelli and daughter, Napa, Calif.
Henry J. Brown and Mrs. Brown, Oshkosh, Wis.
Joseph A. Bullen and Mrs. Bullen, Pueblo, Colo.
Morgan R. Butler and Mrs. Butler, Waukesha, Wis.
J. Paul Calhoun, Columbus, Ga.

(Continued on page 114)

American Mining Congress Holds Biggest Meeting and Exhibition

THE WESTERN DIVISION of the American Mining Congress held its 1952 Mining Show at the City Auditorium, Denver, Colo., on September 22-25, with field trips to several points of interest in the area on September 26-27. Membership of the American Mining Congress, Western Division, is composed mainly of mine owners and top level executives of the metal and nonmetallic mineral mining field. Their scope of interests relates to the fundamental business activities themselves and includes such broad subjects as Washington developments, future economic and technical trends, the relation of the mining industry to public lands, labor subjects, dust and fume control, industrial compensation trends and similar topics. While the members are well grounded in the sciences related to their work, their activities do not overlap those of the American Institute of Mining & Metallurgical Engineers. This observation is made because some first time exhibitors were a little disappointed in not having more mill men, plant designers and operating personnel at the show.

Exhibition

The success of the meeting hinged greatly on the exhibitions which filled the two floors of the City Auditorium, a large wing of the hall, and overflowed outside to three parking lots. There were 153 exhibitors, making it the largest mining show to date. Over 6000 people registered, including 1000 ladies, filling all the hotels and auto courts in Denver.

The success of the meeting can be credited to the manufacturers and to others who went to great expense and study to put on a really great show. There were about 75 separate classifications of exhibitors, ranging from chemicals to wire rope.

Some of the exhibits showed the trends in operating practices and ranged from conventional classification, flotation, dewatering equipment, aerial mapping, use of television for better plant supervision, working model of the heavy-media separation process, latest techniques of automatic applications of hard-surfacing alloys to crusher wearing parts, to future transportation by steel conveyor belts. Scientific approaches to prospecting by the latest in Geiger counters, mine roof support techniques by roof bolting, grouting exhibit designed to show the advantages of additives to concrete for grouting purposes, latest in magnetic separation, and spiral centrifuges and other gravity concentration techniques—these give a few of the interesting highlights of the show. The exhibits were in the same building as the meeting halls, and one afternoon was devoted entirely to their inspection.

Paley Report

Many of the subjects discussed at the meetings are of only indirect interest to rock products producers. One such subject that received much attention was the so-called "Paley Report." This is controversial, much of the opposition to it stemming from the stress it places upon the fact that this nation will become a "have-not" in the decades ahead. One group says the report has some sound aspects; the other, that if Washington would give proper attention to domestic mining and not waste its money and energy on foreign operations, the U.S. miner can solve all our production problems as they arise. They point out that only some 15 percent of the surface of the nation is exposed and much of present day mining started from exposed ore deposits. They feel that the other 85 percent that is covered with overburden can be scientifically explored through constantly improving scientific and geophysical methods. Tax relief, better prices for metals and less Washington control—these will increase our production, it is contended. Instances were cited of world prices for metals being much higher than domestic (and controlled) prices.

Mechanization

The first day activities covered discussions of the Paley Report, national mineral policies, and progress in mechanization. S. S. Clarke, general superintendent, Tri-State Mines, Eagle-Picher Co., Cardin, Okla., discussed the equipment and techniques for trackless mining, breaking, loading and haulage. He felt it was hard to convince manufacturers of the handicap that standard equipment faces in that field; abrasiveness, rough haulage surfaces, slabby nature of material required shop changes to standard equipment. He told of the use of jeeps for supervisory and maintenance work underground. W. H. Love, superintendent, Hecla-Atlas Project, Hecla Mining Co., Wallace, Idaho, told of the "packaged material handling" at the Star Mine of Sullivan Mining Co. There are now four fork lift trucks, three "grab-jaw" trucks, a rubber-tired crane, a warehouse "run-about" and a straddle truck at this operation. These handle mostly packaged mine timbers with savings from 30-70 percent depending on whether it was stulls or lagging being handled. J. H. East, Denver, regional director, U.S. Bureau of Mines, spoke on "Some Practical Aspects of Operating Diesel-Powered Equipment in Underground Non-Coal Mines." His paper showed that in Europe diesels had been used underground for 30 years without a single fatality due to toxic gases. He outlined safety precautions, among which was that the oxygen content always be kept above 20 percent and the carbon dioxide kept under one-half percent. He told of the need for scrubbing exhaust gases by adequate equipment and was much in favor of the use of diesels underground when operated under conventional safety precautions.

The first prepared discussion paper was by John S. Wise, general manager, Idarado Mining Co., Ouray, Colo., on his experience with diesels underground. He was in favor of using 2-cycle diesels and torque converters, for at the mine's elevation (10,700 ft.), this type of engine lost only 7 to 10 percent of its rated horsepower. The company is experimenting with 4-cylinder, 2-cycle diesels with rather favorable results. John L. Fellows, engineer, Limestone Department, Great Western Sugar Co., Denver, outlined his experience with diesels underground at the Horse Creek, Wyo. property where 250,000 tons of limestone are quarried annually. He gave an historical account of the diesel installations and pointed to the use of "Ruth" exhaust gas conditioners that adequately remove all obnoxious and toxic gases. The first conditioners were of steel and corroded quickly, but by the addition of some limestone pebble in the water tank the pH was raised to 6.5-7.0. Later models use stainless steel, thereby eliminating the corrosion problem. He described ventilation conditions in his mine.

The third paper was by Victor C. Allen, assistant manager, Tri-State Zinc, Inc., Galena, Ill., who told of his experience with diesels under ground and gave some cost data on the haulage of 289,829 tons of material. Cost breakdown was: labor; 0.1153¢; diesel fuel, 0.0163¢; maintenance and repairs, 0.0647¢; tires, 0.0273¢; road maintenance, 0.0104¢, giving a total haulage cost (before truck depreciation) of 0.2340¢. The average haul was 1.1 miles, of which 2700 ft. was up a 10 percent grade. Each truck made 16 trips per shift carrying 8.7 tons (dry) per load.

Drilling and Trucking

Ewald Kipp, Eimco Corp., Salt Lake City, Utah, spoke on "Responsibilities of Manufacturer and Mine

Operator," and pointed to the constant need of full cooperation between machinery manufacturer and the user of the equipment so that full savings in mining could be obtained.

The Tuesday morning operating session on open pit mining had a few papers of interest to ROCK PRODUCTS readers. "Blast Hole Rotary Drilling in Open Pit Mining" by George R. Putnam, vice-president, Utah Construction Co., Salt Lake City, Utah, was the first paper. He told of his experience with the Joy rotary drill using Hughes Tricone bits. The operation formerly required six to ten wagon drills for each 6-cu. yd. shovel used at the Cedar City, Utah, plant. One rotary drill is now sufficient for each shovel, he said. The material drilled, mostly overburden, consisted of limestone, sandstone, quartzite and caliche. Over-all drilling speed was 42.2 ft. per hr. including moves. A drill at a second operation, drilling in porphyry and quartzite, averaged 30 ft. per hr. Since bit failures were at the bearings, 7⅜-in. bits were chosen as standard because of their larger bearings. These bits have small teeth for hard rock and large teeth for softer materials. Some drill stems were bent with the higher pressures used. Their over-all experience led the speaker to believe that this type of rotary drill can be used advantageously in practically all types of open pit mining.

"Large Capacity Truck Operation & Maintenance" was reviewed by H. Carroll Weed, assistant general manager, Inspiration Consolidated Copper Co., Miami, Ariz. His paper covered ten mines, in seven of which trucks were the sole means of transportation. The ten mines used a total of 172 trucks and moved 262,000 t.p.d. There were 15 units carrying 45 tons per load, two butane-powered Tournarockers, 52 Darts, 55 Euclids, 43 Macks and five Kenworths. All were rear-dump trucks with some right hand drives. Mobile radio communication was used in some instances. Average hauls were from 0.3 to 2.5 miles with grades from 0.3 to 18 percent. He favored recapping of tires.

The first paper prepared in advance for the discussion period was by Charles A. Lindberg, supervisor of truck maintenance, Oliver Iron Mining Division, U.S. Steel Co., Virginia, Minn. Trucking in Minnesota required over 1400 trucks and these moved 77 percent of the 231,000,000 tons of iron ore and overburden handled. He said the trend in truck sizes was to the 35-ton units with about 400 hp. in one or two diesels and straight rear-dump trucks with tandem rear axles. Some of the larger units had torque converters. Some 50 ton units, two with 550-hp. butane engines, and one with a 600-hp. diesel engine, were under test. General practice was to make minor and running repairs in the pits with major overhauls done at a central garage. Air starters have cut installation costs and give less trouble. Tire performance has gone down with increase in truck sizes. The majority of operators send out their tires for recapping but most do their own tube work and mounting. A Range Mechanical Committee meets monthly and discusses maintenance problems and from its activities costs have been reduced.

The closing paper was by I. S. Tillotson, mining superintendent, International Minerals & Chemical Corp., Bartow, Fla., who described the methods used in the Florida phosphate fields for hydraulic transportation of solids. He reviewed the types of matrix pumped, which were in the minus 14 to minus 16 mesh range. Transfer was by pumping through 8000 ft. of 16-in. steel pipe line. He cited one instance of handling 846 cu. yd. per hr. Solids pumped were about 35 percent, with a sp. gr. of 1.282. At one operation power required was 1.6 kw.-hr. per cu. yd.

Grinding

At the Wednesday morning session two papers brought out some factual data relating to rod mill grinding. The first one was by J. L. Stevens, mill superintendent, Ray Mines, Hayden, Ariz., on "Application of Rod Mills and Ball Mills at Hayden Concentrator." The second paper was by Norman A. Stockett, general mill superintendent, St. Joseph Lead Co., Bonne Terre, Mo. The former's grinding equipment includes four 9- x 12-ft. rod mills that operate substantially in open circuit. Each mill is fed 3750 t.p.d. of ¾-in. rock. Rods were 3½ in. and the liners had 3-in. lifter bars of manganese steel. Mr. Stevens described the rod mill as an economical "fine crushing mill," and said it was also somewhat of a screening machine. The action of the pulp in the mill, he said, was a spiral motion. Liner life was expected to be 6 to 7 years because of the lifter bars. He said exclusion of slimes to a rod mill retarded the flow of pulp through the mill—in other words, slimes act as a lubricant and give greater capacities as a result. Dry reduction ahead of grinding mills is more economical than wet, and should be used if possible, he stated. Higher speeds give greater capacity but also gave greater liner and rod wear and used more power.

Mr. Stockett showed slides of the five new Allis-Chalmers rod mills his company was installing. They are all 9- x 12-ft. machines and would eliminate rolls at one of the mills. His company's plants mill 33,000 t.p.d., of which 16,000 t.p.d. is from the Federal mill. (See ROCK PRODUCTS, June, 1952, page 98, for a description of the tailing control methods at this plant.) The new mills use Lorain liners and 3-in. high manganese steel lifter bars. Feed to the rod mills will be 1 in. Each mill is driven by a 450-hp. motor and carries a 60-ton rod charge. The mills each weigh 80 tons, making a total of 140 tons on the two trunnion bearings. To make it easier to start the mill, each trunnion is equipped with hand-operated hydraulic pump, and before starting a film of oil is pumped under the trunnion. A 6- to 8-year life was expected from the liners based on earlier experience with rod mills.

Mr. Stockett told of "zoning" water to the Federal mill in such a manner that different use elevations received water from an individual pump. Formerly all water was pumped to one elevation, thereby wasting power when the water was used at lower levels. By zoning the water demand, the mill saved about $100 per day. He also described the five 5½-ft. Symons cone crushers and the installation of a new sink and float (not heavy media) plant. He said the trend in filtering in his area was towards the use of disc filters, but Dorrco filters were used for the heavier materials. Besides processing new ore, his company is reclaiming 7,000,000 tons of coarse tailings annually for recovery of their metal content. The company is a large producer of agricultural limestone.

Thursday morning's session was devoted to prospecting and exploration and featured airborne exploration methods and color photography applied to geology via airplanes.

The final day's session was devoted to "rock breaking" and included a paper by Ezell Flournoy, mining engineer, Tennessee Copper Co. Blast hole stoping was described at the Boyd mine. Drilling was done using a Joy HS15 machine and E size, 2-ft. change drill rods and concave diamond bits. An average of 135 ft. of hole was drilled per man-shift. Blasting brought down 2.5 tons per foot of hole drilled using 1¼- x 12-in. high velocity dynamite. Carbide bits were used in some types of ore.

Alloy hollow drill rods were jointly discussed by Robert W. Persons, products sales manager, and Wm. H. McCormick, chief metallurgist, both of Crucible Steel Co. of America. As much of the drilling today is done with some sort of detachable bit, or with steels having carbide inserts, this has brought about a trend towards smaller sizes of hollow drill steel which in turn has increased the demand for alloy drill steel. They described some of the alloy steels and some that were under development, and mentioned studies that were underway to determine the effect of alloy compositions on peening or mushrooming of rod ends. These studies indicate that resistance to peening is generally a function of the heat-treated hardness. As an illustration, they advised against changing from 1¼-in. carbon rod to a ⅞-in. hex alloy rod unless less rigidity can be tolerated. The alloy rods have the same modulus of elasticity as the carbon rods, they reported.

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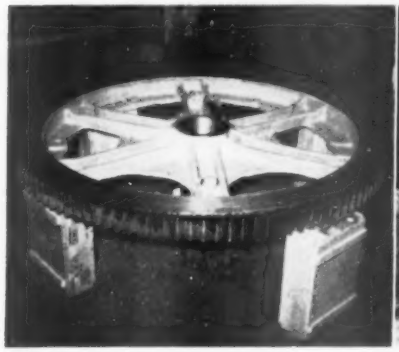
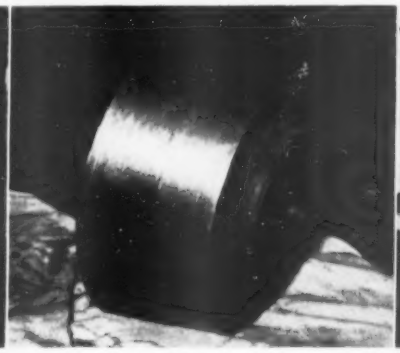
1 BUCKET TEETH, LIPS, SIDES, BOTTOMS
ALLOY: *Stoody Self-Hardening 21 or Stoody 1027.*
APPLICATION: *Manual—stringer beads or solid overlays on wear areas.*
RESULTS: *Maintains size, reduces wear, retains full bite and load.*

2 LATCH PLATES AND KEEPERS
ALLOY: *Stoody Self-Hardening or Stoody 1027.*
APPLICATION: *Manual—build to size and peen to shape while red hot.*
RESULTS: *Effects positive latch closure. Negligible cost.*

3 SHEAVES
ALLOY: *Stoody 104 or Stoody 107.*
APPLICATION: *By automatic—machinable deposit.*
RESULTS: *Prevents grooving, increases rope life.*



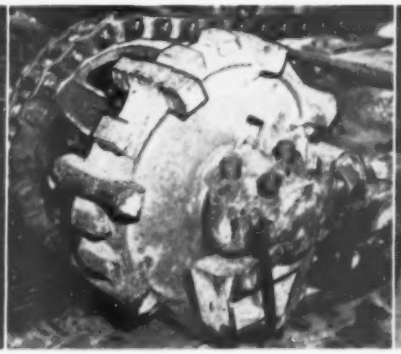
4 HOUSE BASE RINGS
ALLOY: *Build up with Stoody 104, finish with Stoody 107.*
APPLICATION: *By automatic—machinable surface.*
RESULTS: *Reclamation ¼ of new ring cost.*



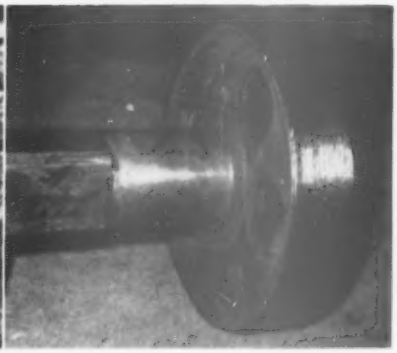
5 HOUSE ROLLERS
ALLOY: *Stoody 107.*
APPLICATION: *By automatic—machinable surface.*
RESULTS: *Restores contour, doubles life at 1/3 the cost.*

6 SHOVEL IDLERS AND ROLLERS
ALLOY: *Stoody 105.*
APPLICATION: *By automatic—no finishing necessary.*
RESULTS: *Restores wearing faces, doubles life at ½ original cost.*

7 TRACK PADS
ALLOY: *Stoody 1027.*
APPLICATION: *Manual—rebuild with Stoody High Carbon, overlay with Stoody 1027.*
RESULTS: *Doubles life at ½ cost.*



8 DRIVING TUMBLERS
ALLOY: *Coated Stoody Self-Hardening or Stoody 1027.*
APPLICATION: *Manual—rebuild drive lugs.*
RESULTS: *Doubles life at ½ original cost.*



9 SWING BRAKE DRUMS
ALLOY: *Stoody 106.*
APPLICATION: *By automatic—machine to finish.*
RESULTS: *Illustrated type reclaimed for 15% of new cost, outlasts new drum.*

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there were many accidents, of which most were cut veins in the workers' wrists.

A safety committee is operating, on which foremen are rotated with J. J. Murdock, who is in charge of maintenance and safety. One or two men from the labor group and the plant nurse serve on the committee. Meetings are held monthly at which reports on various items of safety are considered. When these items are completed they are marked off the list and some of the items are brought up for review. Routine items to be taken care of in the interests of safety are handled at the plant level, but if appreciable cost is involved the plant works through the engineering department in obtaining needed appropriations. He pointed out that when planning new construction many potential hazards can be caught on the drafting board where correct steps, walkways, etc., may be provided.

Employe Relations

Human relations and contract negotiations were covered in a panel discussion with audience participation. The panel consisted of Frank R. Cadman, Warner Co.; Frank R. Dittoe, The Kelley Island Lime and Transport Co. and Charles H. Dwyer, National Gypsum Co. F. C. Mallery was moderator.

In introducing the subject, Mr. Mallery said that human relations is a phase of the industrial revolution that is sweeping the country. Industry must recognize that workers desire to feel important and should be treated with respect. The worker is not only interested in wages, said Mr. Mallery, but he wants security and recognition. While a man's presence can be bought by paying for his time spent in work, his initiative and his enthusiasm cannot be bought. Management must earn these attributes, stated Mr. Mallery, since the will to work is the key to productivity and industrial harmony. Success in attainment of these goals depends on some of the simple things in employe relations and the question is what they are and how should the employer go about the problem.

Mr. Cadman expressed the problem as one whereby top management must multiply its principles throughout the organization. Successively, from the top, sound principles must be developed in individuals who in turn will develop them down the line of responsibility.

Employes should know all the rules that apply in relation to their employment in order to prevent misunderstandings. Mr. Cadman recommends the use of manuals to set forth regulations for truck drivers, the workings of welfare plans, etc. In his company, the personnel manager goes over the regulations with new employes and has them sign an agreement to the effect that the rules have been gone over and are understood.

Another suggestion by Mr. Cadman is that a system of job breakdown be worked out so that the factors involved in a given job may be discussed and workers thereby be properly trained. To point out the value of this procedure, he mentioned how a 2-day instruction program was effective in reducing the cost of accidents over $15,000 over a year's time.

He believes that a company publication is an effective means of building employe morale. Such publications should attempt to build up the employe, use photographs to illustrate job promotions, give costs of plant installations, explain the functions of the various departments and set forth the earnings record of the company in its educational functions.

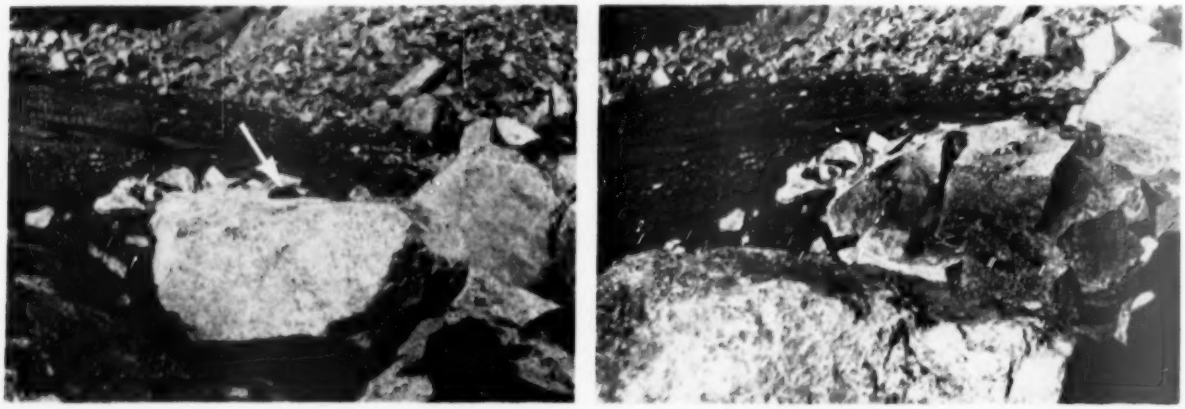
The Warner Co. has a separate suggestion system, one for safety and one for production, and has a management-labor committee at each plant location to pass on awards. Meetings of foremen are held regularly, in a policy of keeping the workers informed rather than waiting for the unions to do it first. Top management is represented in these meetings. Mr. Cadman stressed the need for action rather than words. Mr. Dwyer, in discussing contract negotiations, said that each is a separate entity and that his company does not take the same course at its various plants. He is not so much interested in the wording of contract clauses as he is in the feeling of good will, or lack of it, that prevails. The spirit of good intentions exists in working up a contract agreement if a program has been conducted that has developed the right attitude among workers in a plant.

His company has some loosely worded contracts and they are representative of the highest degree of harmonious labor relations. Contracts are not really a one-year proposition, said Mr. Dwyer, but they are a check on how successful labor-management relations have been through a year. The occasion of working out a new contract is an effective check on the performance of management and its foremen and negotiations are simple or difficult in proportion to the relationship that exists between employer and workers.

As far as contract administration is concerned, Mr. Dittoe said that the use of simple language and the avoidance of legal terminology are desirable. A labor contract is a code of rules to govern the labor-management relations, he said, and does not create the relationship. Cases that come up before the courts result, as a rule, from a lot of breaches rather than one infraction, his experience has shown.

In dealing with union representatives, he reminded that it is well to remember that the union agent is elected and that he, as part of a democratic group, is subjected to pressures and is not a free agent. Management should be careful not to embarrass the union representative unduly and should not be too technical in the interpretation of clauses. A practice of being "too fair" can sometimes have bad consequences, he said.

Mr. Mallery briefly touched upon public relations. He said that an an-



Left: A 6-ton granite boulder in an operation in West Virginia shown before detonation of shaped charge (arrow). Right: Results of blast; note absence of throw of rock particles

nual sponsored event is not enough and that public relations covers far more than just publicity. On the contrary, it is something that must go on daily so that a plant may be looked upon with favor by the public and public officials.

In the question and answer period following discussion by the panelists, it was brought out by Mr. Cadman that any work rules should be given out or at least posted. They should not be written into a contract. In reply to a question on the wording of seniority clauses in a contract, Mr. Dittoe said that the less said in the contract the better. If necessary to have in writing the procedure to govern lay-offs, rehiring, etc., it is best, usually, that seniority be stipulated to govern where jobs are of the same class.

Mr. Dwyer's experience is that seniority clause provisions are of greatest importance in contracts. Contracts should be written properly on that score so as to protect management in its rights to recognize the ability of a man to fill a job rather than be based on years of service as such.

There was considerable discussion on ways to determine a man's ability to perform a job. A suggestion was that trial work periods be the basis of determination and that unions have no part in the procedure. The evaluation of jobs and the conduct of safety procedures should be reserved entirely to management, in the opinion of the panel experts.

In answer to a question as to procedure if a man refuses to follow work rules, it was suggested that the man first be informed in advance of his continued violations and the consequences, the next step being to take disciplinary measures and revert to grievance procedures. It was stressed by Mr. Cadman that proper warning is important in cases of minor infraction of rules. Practice might be first to give verbal warning, followed by written warnings and, if infractions persist, the procedure is to dismiss the worker.

Mr. Cadman takes the position that everything unsaid in a contract is management's right and that the more things written into a contract the more management has lost. If there be equal abilities and physical fitness for a specific job, seniority will prevail.

In reply to a question on failure of men to report for work, it was stated that the rules should require reporting for work. For failure to comply after several warnings, it has been found that unions will then generally back management because their objective is to have men work. One producer said that if a worker takes a day off without cause that he is required to report in. The substitute worker is kept on the job an additional day and the defaulting worker is required to take another day off to think it over. It has proved successful.

One producer said that unions can be prevailed upon to go along with testing procedures on job abilities and that that is essential. His practice is to help train men to pass the tests. As far as the question of a closed shop is concerned, producers told of having more cooperation of the unions because they have not resisted the movement. If the unions represent the majority, the effect is to show that management is not resisting unions.

Blasting

Recent developments and progress in the use of shaped explosive charges in quarrying, mining and construction was the subject of the concluding paper, by John L. Miller, general manager, Shaped Charge Explosive Manufacturers, Inc., Martinsburg, W. Va.

Mr. Miller first detailed the development of this system of secondary blasting and the perfection of a principle first used in World War II for the penetration of armour, to penetration with fragmentation when applied to rock. These blasting units, in the form of discs containing the explosive, are merely placed on boulders, or hung alongside them, in the process of secondary blasting. Rock

Method of placing a shaped charge on a 6-ton boulder. Note placement of detonator in charge; electric cap is being used here

pieces do not fly but fall in place, which is one advantage claimed for use of these blasting units.

When a unit is placed on top of a boulder, as near its center as possible, the blasting cap is inserted in the hole provided and is exploded. Primacord may be used for detonation. The great majority of the explosive composition comprises ammonium and sodium nitrates. Five different sizes of units are manufactured, which are sold based on their capacity to break rock.

Among advantages claimed are savings in wages paid to jackhammer operators, the cost of drilling equipment and its maintenance, the cost of moving equipment out from and back to the blast area, the cost of bulldozing scattered pieces of shattered boulders, the cost of setting aside boulders for secondary drilling and a reduction in the powder crew.

Mr. Miller admitted that there are many applications in which conventional block-hole drilling might be better but he has observed that many quarry operators do not know their secondary drilling and blasting costs. Shaped charges are being used for limestone, marble, granite and trap rock for blasting boulders as large as 50 and even 75 tons. For the larger boulders, the use of two blasting units is often advisable. Mr. Miller told of a case where he blasted 1500 tons of boulders in 3½ hr., while a blasting crew required 4 hr. to drill a single boulder in the same quarry. He told of tight places where shots were made right next to the power shovel or crushers while they continued in operation. Work is being done in perfecting a cartridge especially for bottom loading along with the primary drilling, in an attempt to eliminate toes.

Ordinary mud-capping often leads to over-shooting, he said, with the production of excess fines, a condition which can be more readily controlled with shaped charges. It was admitted that the noise factor might make it inadvisable to use them in some locations, although noise is not associated with ground vibration. Development is now in process on dynamite speeds for various conditions. Mr. Miller described a variety of applications under unusual job conditions to illustrate the flexibility and utility of his product.

The registration list of members attending the National Lime Association Operating Division meeting will be found on page 103.

Kansas Feldspar

KANSAS STATE GEOLOGICAL SURVEY has devised a method for producing, economically, feldspar and silica from certain sands collected along the Kansas and Arkansas Rivers. The derived feldspar and silica, as chemically analyzed, meet the use specifications required by the state's expanding ceramic, glass, glass fiber, and allied industries. At present these industries are importing the needed minerals.

"Experimental Production of Feldspar and Silica From Several River Sands in Kansas," a publication presenting the results of these studies carried out in the laboratories of the University of Kansas, has been released. The authors are Frank W. Bowdish and Russell T. Runnels.

HERE'S PROOF RIGHT IN YOUR OWN QUARRY THAT YOU CAN CUT COSTS 4 WAYS

Yes, you can see **DETONITE** in action right at your quarry. Prove to yourself that **DETONITE** cuts your costs in these four important ways:

1. BLASTING COST
KING DETONITE is a slow-detonating powder. Its slow, heaving, spreading action lifts and fully displaces the burden. High cost of secondary drilling and shooting is greatly reduced.

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KING DETONITE breaks up rock into sizes that permit shovels to dig efficiently at all times, thus reducing handling costs to a minimum.

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KING DETONITE's proper fragmentation means less wear and tear on expensive equipment . . . less cost for maintenance and replacement.

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KING DETONITE's proper fragmentation allows your crushers to operate at top capacity, thus lowering cost of processing the stone.

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Cincinnati 1, Ohio

SHOW ME how DETONITE will cut my costs 4 ways. Without obligation, have the King Representative get in touch with me to arrange for a DETONITE demonstration right at our quarry.

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Title_____
Company_____
Address_____

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THE KING POWDER CO., INC

CINCINNATI 1, OHIO

MAKERS OF QUALITY EXPLOSIVES SINCE 1878

Following is the registration list of members attending the National Lime Association Operating Division meeting. The report on the meeting begins on page 82.

Registration

Company	*Location*	*Representative*
Ash Grove Lime & Portland Cement Co.	Kansas City, Mo.	A. K. Frolich
Ash Grove Lime & Portland Cement Co.	Springfield, Mo.	Carl L. Morris
Ash Grove Lime & Portland Cement Co.	Kansas City, Mo.	Paul Sunderland
Baker, J. E., Company, The	York, Penn.	Robert A. Paul
Cantwell Machinery Co.	Columbus, Ohio	Don Schulte
Cheney Lime & Cement Co.	Birmingham, Ala.	Alan B. Cheney
Corson, G. & W. H., Inc.	Plymouth Meeting, Penn.	Charles Cloud
Corson, G. & W. H., Inc.	Plymouth Meeting, Penn.	Philip L. Corson
Corson, G. & W. H., Inc.	Plymouth Meeting, Penn.	C. F. Dunkelberger
Corson, G. & W. H., Inc.	Plymouth Meeting, Penn.	C. C. Fulmer
Dow Chemical Co., The	Ludington, Mich.	L. N. Carmouche
Dow Chemical Co., The	Ludington, Mich.	C. Stielstra
Dow Chemical Co., The	Ludington, Mich.	A. Sundholm
Kaiser Aluminum & Chemical Corp.	Salinas, Calif.	D. M. Kerr
Kelley Island Lime & Transport Co., The	Cleveland, Ohio	J. V. Andrews
Kelley Island Lime & Transport Co., The	Buffalo, N.Y.	Albert W. Busch
Kelley Island Lime & Transport Co., The	Cleveland, Ohio	Frank R. Dittoe
Kelley Island Lime & Transport Co., The	Cleveland, Ohio	Maurice Henery
Kelley Island Lime & Transport Co., The	Cleveland, Ohio	William A. Roberson
Kelley Island Lime & Transport Co., The	Cleveland, Ohio	L. E. Smith
Kelley Island Lime & Transport Co., The	Cleveland, Ohio	L. W. Tillotson
Keystone Lime Works, Inc.	Keystone, Ala.	K. L. Hammond
International Paper Co.	New York, N.Y.	William D. Peters
International Paper Co.	Baltimore, Md.	Lee Turner
Lee Lime Corporation	Lee, Mass.	John W. Gaisford
LeGore Lime Co.	LeGore, Md.	J. P. Feiser
LeGore Lime Co.	LeGore, Md.	Harry LeGore
Limestone Products Co.	Menominee, Mich.	Jesse J. Jacobsen
Limestone Products Co.	Menominee, Mich.	Stephenson Smith
Marble Cliff Quarries Co.	Columbus, Ohio	R. W. Bowen
Marble Cliff Quarries Co.	Columbus, Ohio	C. B. Geiger
Marble Cliff Quarries Co.	Lewisburg, Ohio	J. O. Leonard
Marble Cliff Quarries Co.	Columbus, Ohio	Charles Rarey
Marblehead Lime Co.	Chicago, Ill.	J. E. Jackson
Marblehead Lime Co.	Chicago, Ill.	Clarence Jorgensen
Marblehead Lime Co.	Chicago, Ill.	Lee H. Niems
Marblehead Lime Co.	Chicago, Ill.	Wallace E. Wing
Menke Stone & Lime Co.	Quincy, Ill.	E. H. Siebrasse
Millard, H. E., Lime & Stone Co.	Annville, Penn.	Casper E. Arndt
Millard, H. E., Lime & Stone Co.	Annville, Penn.	Harlin Kinney
Millard, H. E., Lime & Stone Co.	Annville, Penn.	E. D. Williams
Millard, H. E., Lime & Stone Co.	Annville, Penn.	Earnest D. Williams, Jr.
Moores Lime Co., The	Springfield, Ohio	John Moores
National Gypsum Co.	Buffalo, N.Y.	W. F. Ackerman
National Gypsum Co.	Luckey, Ohio	Fred Chambers
National Gypsum Co.	Buffalo, N.Y.	Charles H. Dwyer
National Gypsum Co.	Bellefonte, Penn.	H. E. Gustafson
National Gypsum Co.	Luckey, Ohio	F. C. Mallery
National Gypsum Co.	Buffalo, N.Y.	Amos B. Miner
National Gypsum Co.	Kimballton, Va.	Monroe Rule
National Lime Association	Washington, D.C.	Robert S. Boynton
National Lime Association	Washington, D.C.	Kent Jander
National Lime Association	Washington, D.C.	Gladys L. McBee
New England Lime Co.	Canaan, Conn.	W. J. Ash
New England Lime Co.	Adams, Mass.	W. J. Barrett
New England Lime Co.	Adams, Mass.	Louis Pongiolatti, Sr.
New England Lime Co.	Adams, Mass.	A. Clyde Horton
New England Lime Co.	Adams, Mass.	Frank S. White
Nichols Eng. & Research Corp.	New York, N.Y.	George E. Connolly
Ohio Hydrate & Supply Co., The	Woodville, Ohio	A. H. Nieman
Ohio Hydrate & Supply Co., The	Woodville, Ohio	D. K. Russell
Pit and Quarry	Chicago, Ill.	W. M. Avery
Riverton Lime & Stone Co.	Riverton, Va.	P. L. Rogers
Riverton Lime & Stone Co.	Riverton, Va.	H. W. Smith
Riverton Lime & Stone Co.	Riverton, Va.	E. I. Williams
Rock Products	Chicago, Ill.	Bror Nordberg
St. Regis Sales Corp.	Allentown, Penn.	Burton Ford
St. Regis Sales Corp.	Baltimore, Md.	John F. Gruber
St. Regis Sales Corp.	New York, N.Y.	H. S. Hangen
St. Regis Sales Corp.	Buffalo, N.Y.	Kenneth L. Moore
Shaped Charge Explosive Mfrs., Inc.	Martinsburg, W. Va.	John L. Miller
Southern Cement Co.	Birmingham, Ala.	M. A. Rikard
Southern Cement Co.	Birmingham, Ala.	C. W. Streit, Jr.
Tennessee, Univ. of, The	Knoxville, Tenn.	W. H. MacIntire
United States Gypsum Co.	Chicago, Ill.	T. A. Dent
United States Gypsum Co.	Chicago, Ill.	D. J. George
Utah Lime & Stone Co.	Salt Lake City, Utah	T. R. Ellerbeck
Virginia Iron, Coal & Coke Co.	Roanoke, Va.	John E. Husted
Warner Co.	Philadelphia, Penn.	Frank R. Cadman
Warner Co.	Bellefonte, Penn.	A. C. Hewitt
Warner Co.	Bellefonte, Penn.	E. R. Mallory
Warner Co.	Devault, Penn.	John J. Murdock
Warner Co.	Philadelphia, Penn.	E. L. Shoemaker
Warner Co.	Bellefonte, Penn.	George Shugert
Warner Co.	Bellefonte, Penn.	Fred Warner
Warner Co.	Philadelphia, Penn.	Irving Warner
Warner Co.	Philadelphia, Penn.	Lea P. Warner, Jr.
Warner Co.	Devault, Penn.	J. G. Wilson
Warner Co.	Devault, Penn.	Horace L. Woodland
Winnipeg Supply & Fuel Co., Ltd.	Winnipeg, Canada	R. G. Foster
Winnipeg Supply & Fuel Co., Ltd.	Winnipeg, Canada	Hugh H. Sheperd

50% Greater Concrete Strength Achieved

The Yoder Company of Cleveland, Ohio, reports Sterling Speed-Trol, powering their revolutionary Continuous Concrete Mixer, gives the variable speed control necessary for continuous, accurate proportioning and mixing which made development of this machine possible. Compared to batch mixers, the Yoder Mixer increases concrete strength 50%, increases production at lower cost, and reduces equipment and maintenance costs over 50%.

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GIVES YOU VARIABLE SPEED CONTROL NECESSARY FOR:

Equipment adaptation to: Sequence synchronization — operators' abilities — load variations due to differences in quantity, quality, weight, size, tension, hardness or shape of material to be processed, machined, conveyed, blended, mixed, etc.

Process control of: Temperature — viscosity — level — pressure — flow — etc.

Time control of: Baking — drying — heating — cooking — pasteurizing — soaking — chemical action — etc.

With Speed-Trol you get the maximum in production, plant efficiency, quality & profit.

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Plants: New York City 51; Van Wert, Ohio; Los Angeles 22; Hamilton, Canada; Santiago, Chile
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Dig Everything from Mud to Rock *with*

STOCKTON "YUBABILT" CLAMSHELL BUCKETS

Stockton "Yubabilt" Power-Arm type clamshell bucket, 6 cu. yds., 22,000 lbs., welded steel plate construction, round nose without teeth, custom-built for Hawaiian Dredging Co.

2 TYPES—California and Power-Arm
CAPACITIES—½ to 6 cu. yd.
3 WEIGHT CLASSES—Heavy; Standard; Special Light Weight
WEIGHT RANGE—2125 lbs. to 45,000 lbs.

California Type designed expressly for channel and reclamation dredging, has few working parts, well balanced for digging peat soil, river bottom adobe and mud; discharges quickly and cleanly. First built in 1872, produced continuously ever since.

Power-Arm Type built for tough, continuous digging of rock, hardpan, coral and other hard, abrasive materials. Correctly balanced weight and powerful closing action provide exceptional digging ability. Especially suited to close-up work near wharves and on caisson jobs.

Both the California and Power-Arm types are built in all three weight classes:

HEAVY for extra penetration in tough digging.

STANDARD for most dredging jobs.

SPECIAL LIGHT WEIGHT for soft, slushy materials.

Consult us about clamshell buckets. Estimates gladly furnished. Wire, write or call NOW.

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P. O. Box 1331 Stockton, California

50

Rocky's Notes

(Continued from page 53)

their terms of employment, working conditions, hours and wage rates. Finally, the Baton Rouge Central Labor Union withdrew its petition to the N.L.R.B. under the direct instructions of President William Green of the A.F. of L. At present, the Electricians (I.B.E.W.) are trying to carve out a unit of cement workers in the Baton Rouge plant under the provisions of the Taft act.

"Space does not permit the recording of other similar interferences by A.F. of L. unions with established local unions of our organization. Nowhere have these Taft-Hartley raiding unions tried to organize any of the few non-union cement plants in the United States. These uncalled for interferences are made permissible and encouraged by the Taft act. Our experiences are a sordid indication of certain pure and simple craft unions whose greed causes them to use the Taft act in a manner detrimental to our movement. The framers of the Taft act envisaged that its provisions contained the best weapons to destroy the labor movement, namely, the machinery to encourage disruptions, raids, divisions and destruction from within. Justice and fair play should cause the Machinists to at least be as consistent within the A.F. of L. movement as they are in their relations with the C.I.O. Automobile Workers. According to the official publication, 'The Machinist,' the I.A.M. and U.A.W., C.I.O., have extended their no-raiding agreement originally signed in 1949. According to the report, the parties 'have agreed that our organizing efforts should not be dissipated in raids on already organized plants and should be concentrated on organizing the unorganized.' There is an old adage which comes to mind in this connection: 'Practice what you preach.' "

We sympathize sincerely with the Cement Workers' union, and we believe many employers who have contractual relations with it will, too. However, to us, their complaint is only one more example of the futility of attempting to legislate the fine points of ethical conduct. We have seen it attempted in codes of ethics of trade associations and elsewhere. In the final analysis, if the will to do crooked things (or unethical conduct) is there, nimble-witted individuals will always find a way to accomplish their ends. The real cure, it seems to us, is to put people as heads of labor unions who hold to some ethical principles, such for example, as the head of the Cement Workers' union.

Rock Wool

MUMFORD CO., INC., producer of rock wool, has opened two sales divisions in Jacksonville, Fla. Three additional divisions are also planned.

QUICK, EASY DISASSEMBLY MEANS

Low Service Cost

ALLIS-CHALMERS
COAL WASHING PUMP

1. Disconnect drive, loosen casing bolts and lift bolt assembly from slot. Bolt, nut and washers are still connected for easy reassembly.

2. Swing out rotating element. Neither suction nor discharge piping is disturbed. All wearing parts are fully accessible for inspection or servicing.

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Coal Washing Pump

Only 5 Wearing Parts

Shaft sleeve, impeller, casing, two wear plates. All easy to handle and easy to replace.

YOU CAN SEE for yourself how quick and easy it is to service an Allis-Chalmers Solids Handling Pump. Fast servicing like this plus long runs between servicing keeps your pumping costs low.

You get long life from Allis-Chalmers Coal Washing Pumps, too, because they are made of special hard *Allisite* alloy . . . because they have thick sections and heavy parts throughout . . . and because they are application engineered by specialists who know coal washing problems and how to solve them. Allis-Chalmers can supply the complete pumping unit — pump, motor, drive and control — of matched components from one reliable source with one guarantee of satisfaction.

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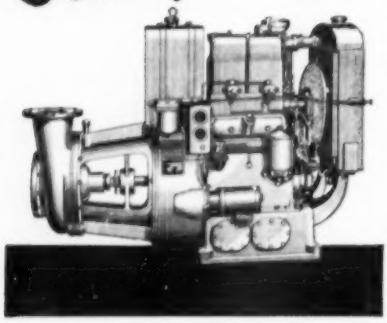

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• NORDBERG "4FS" Diesel Pumping Units are available in 1, 2 and 3-cylinder sizes, combining low cost, reliable power with efficient centrifugal pumps for practically all pumping jobs. Users report saving $100.00 a month over gasoline powered pumps. Capacities from 200 to 3200 gpm. at 20 to 220 ft. head.

Other Nordberg "4FS" Diesels are available as "packaged" generator sets, producing from 6 to 30 kilowatts . . . and as straight power units in sizes from 10 to 45 H.P. with stub shaft or clutch power take-off drives. For full details, mail the coupon now.

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Please send literature describing the full line of Nordberg "4FS" Diesel Power Units.

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Labor Relations Trends

(Continued from page 55)

Injunction Granted

"Prior to the entry of a decree in which the defendants were permanently enjoined from picketing, the court said:

" 'Considering all the testimony in the case, the court is of the opinion that no labor dispute existed at the Postma plant; that there was no legitimate labor dispute objective in the establishing of the picket line at plaintiff's place of business; that the defendants were seeking to accomplish an improper and illegal labor objective in picketing plaintiff company's premises, and in cutting off its supply of cement. Plaintiffs are, therefore, entitled to the relief prayed in their bills of complaint.'

"Defendants of appeal argue that the decree is a violation of their rights under the Thirteenth and Fourteenth Amendments of the Constitution of the United States; that it imposes involuntary servitude upon them, deprives them of freedom of speech and of property without due process of law. The propriety of this decree must be tested by a determination of whether there was a lawful labor dispute and whether the union sought to achieve a lawful labor objective.

"It is conceded that no dispute exists between Postma and his employes, but, rather, the dispute is between the union and Postma and the union and Postma's employes.

"It is not necessary that a dispute exist between an employer and his employes in order to permit peaceful picketing, because if the economic interests of other employes engaged in the same industry are affected, they may through their representatives publicize their grievances by peaceful picketing. [Various legal references cited.]

"What was the objective of the defendants? The motive for picketing is always a question of fact, and here an exceeding close one. We have, therefore, considered that excluded evidence returned in the separate record, which we deem relevant in order to determine the purpose and motives of the defendant union and its officers. The union claims:

" 'The picket line was to be placed to show the general public that through our method of advertising to the general public that there was an unfair condition with Postma Gravel Co. because they were paying beneath the rates at that time; * * * they (the employes of Postma company) were holding us back.'

"This claim is supported by the testimony of defendant Mackey and the pay stub of one of Postma's employes, as well as the contracts finally negotiated between the union and Postma's competitors.

" 'This objective, viz., the bettering of the working conditions and wages of non-union members in the industry, so as to remove the barrier to increased benefits to union members, we must deem to be a lawful labor objective, if not otherwise prohibited by law.'

"Postma contends, however, that defendants' claim is a mere sham and that they were attempting to force his employes to join the union and force him to enter into a contract giving it sole bargaining rights.

"There is little in the testimony to indicate that a publicizing of unfair wages and working conditions at Postma company was the primary purpose of defendants' picketing. The existence of such 'unfair wages and working conditions' was not established to any degree of certainty. The only evidence regarding wages was Mackey's testimony and the pay roll stub of one employe. The only testimony regarding working conditions was that Postma's employes had no guarantees as to the terms of their employment.

"Even if such facts were proved, Mackey's answers to the following questions indicate a different objective. He was asked:

" 'Mr. Mackey, even if all of the employes at the Postma Sand and Gravel Co. were getting at least or more than the uniform wage scale you have negotiated with the other two gravel companies, but if they still were not members of your union would you consider your union to be in distpute with those employes?'

"He replied: 'Yes, sir.'

"Mackey was asked on cross-examination:

" 'It is your contention that the only way that this dispute can ever be removed between your union and Postma employes is for them to join your union, is that right?'

"He replied:

" 'I believe that they should join our union; that they have been getting the benefits that we have negotiated, so why shouldn't they join our union.'

"According to Mackey, it would make no difference whether Postma paid as much or more than the uniform wage scale, because he stated that the only way to settle the dispute would be for Postma's employes to join the union. Defendant's objective, therefore, was to force Postma's employes to become members of the union."

Permanent Injunction

"In Harper vs. Brennan, 311 Mich. 489, and Standard Grocer Co. vs. Local No. 406, A.F. of L., 321 Mich. 276, the Court held (the writer of this opinion dissenting) that, under the provisions of the statute (CL 1948, §423.17 (as amended by Act. No. 230, PA 1949), Stat ANN §17.454 (18)) an attempt to force employes to become unionized either directly or indirectly through their employer is not a lawful labor objective. Under the authorities cited, we are obliged to hold that the permanent injunction

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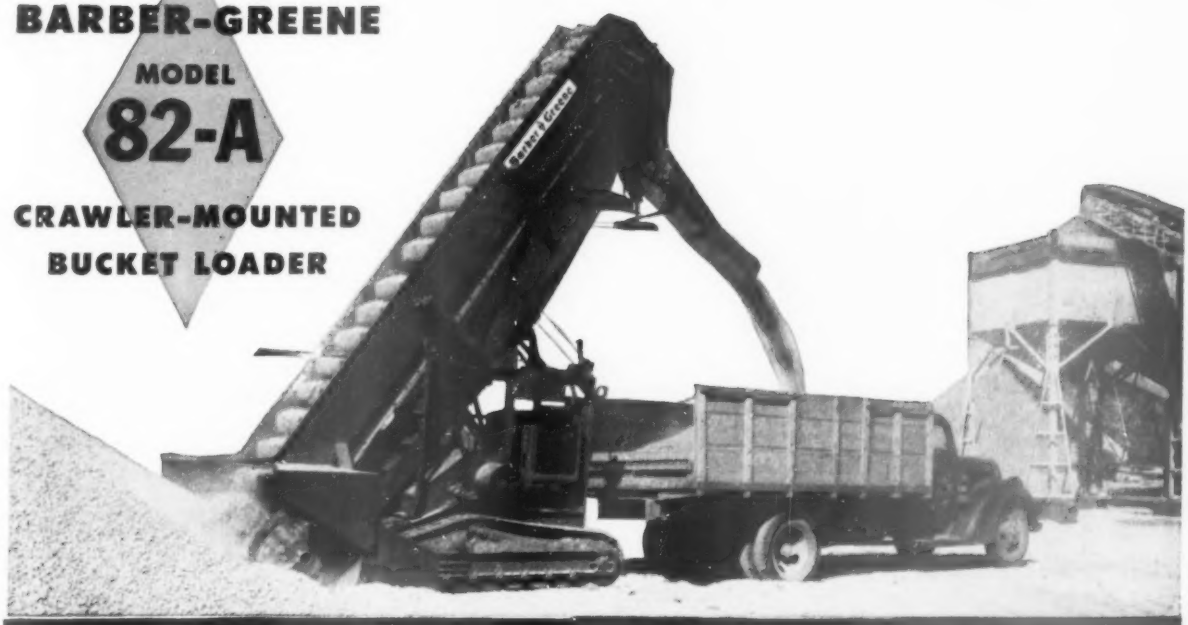
BARBER-GREENE

MODEL 82-A

CRAWLER-MOUNTED BUCKET LOADER



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A B-G 82-A Bucket Loader is by all odds the cheapest and fastest method of loading free-flowing materials into trucks. Exhaustive cost analyses made throughout Barber-Greene's over 30 years' experience (during which B-G Loaders handled over a billion yards of material) have consistently proved this.

Simple controls mean that each driver can load his own truck . . . no need for an expensive operator. Each truck can be loaded to full capacity without spillage . . . without truck damage or undue truck wear.

Crawler-mounted, the 82-A provides positive traction in all kinds of going—on soft or muddy bases—on spots where pneumatic-tired rigs can't operate.

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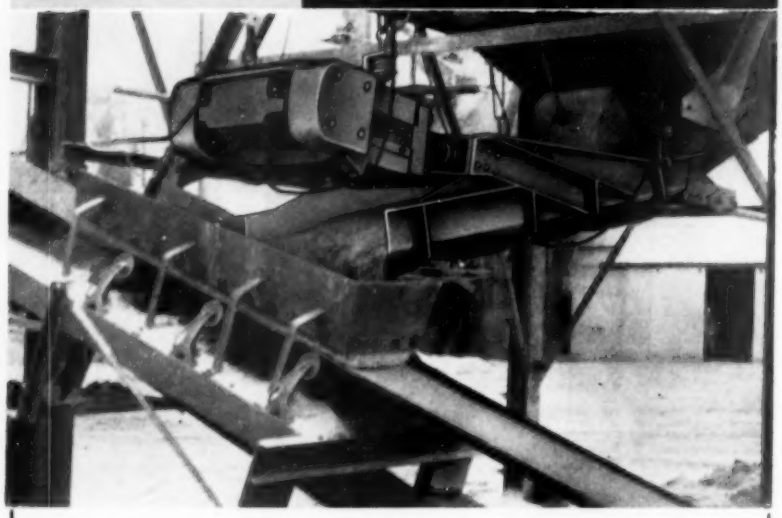
Cut out OVERLOADING UNDERLOADING



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Syntron Vibratory Feeders provide an efficient, economical method of conveying bulk materials and the simplest and easiest means of controlling the rate of flow.

All along your production line materials can be made to flow as desired — your processing plant need never be starved or overfed — with Syntron Vibratory Feeders your feed rate can be varied to provide a flow of materials to suit your needs.

Overloading or underfeeding is thus avoided without constant supervision — no more overflows that waste materials — no more tie-ups or material shortages that slow production — your processing can be continuous with maximum output and efficiency, plus — minimum maintenance costs. Due to the absence of mechanical wearing parts, Syntron Feeders operate with an exceptionally low maintenance cost.

MATERIALS HANDLED INCLUDE

- Rock from dump truck to crusher . . .
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- Frit to a Bag Filler . . .
- Pit Run Gravel in Primary System of a Rock Plant . . .
- Clay to a Pan Mill Refractory . . .
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They are available in a number of models and trough styles, with capacities up to 500 tons per hour, that are readily adaptable to many processing systems.

Our Engineering Dept. will gladly recommend the correct model Syntron Feeder for the solution of your feeding problems. Please include all pertinent data, such as material to be fed, percentage of moisture, approximate tonnage requirements per hour, etc.

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SYNTRON COMPANY
450 Lexington Avenue Homer City, Penna.

entered by the circuit court does not violate any of the constitutional rights of the defendants.

"The decree is affirmed, with costs to appellees.

"John R. Dethmers, Henry M. Butzel, Leland W. Carr, Edward M. Sharpe, and Neil E. Reid, concurred with Bushnell, J.

"Emerson R. Boyles, concurred in the result."

Profitable Agstone Sales

(Continued from page 71)

4000 to 6000 lb. per acre of agricultural limestone.

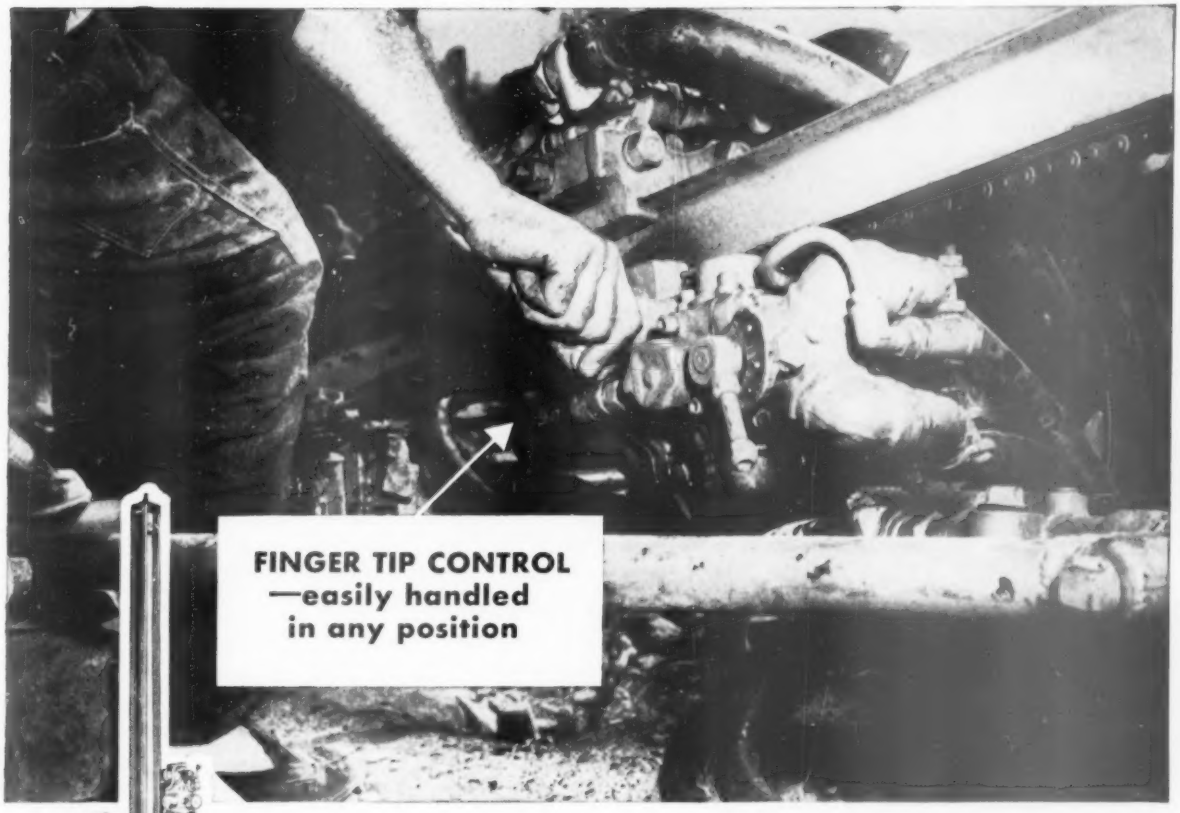
Mr. Riddle believes in an over-all control of operations from production down through the field of distribution and in education of his prospective customers which occupy this western fringe of the lime-deficient soil of the country. His field can well be called a frontier as there are no known agricultural limestone plants to the west. The nature of the business demands an exacting service and efforts to split responsibility have not been too satisfactory.

Operation of spreader trucks with his own crews is definitely a part of the responsibility that he does not think wise to relinquish. The problems of control of delivery and spreading, selection of destinations, orderly planning of shipments, strategic stockpiling, and proper driver contact with customer cannot be passed on without throwing operations off balance. A seasonal business makes further control mandatory and is not favorable to subcontracting. By the same token, equipment can be economically turned to other uses not affected by the same seasonal limitations. "We look upon our customers," said Mr. Riddle, "with the same broad conceptions of good will and maintenance as other growing businesses dependent upon public support. For this reason, we want to carry the full load of responsibility."

He is a member of the board and executive committee of the National Agricultural Limestone Institute. Mrs. Riddle is an efficient partner in handling the distribution end of the business and manages the Riddle Soils Service, Inc.

Computing Price Ceilings

GENERAL OVER-RIDING REGULATION 35, which permits manufacturers using steel, copper and aluminum to add 100 percent of their increased material costs to their ceiling prices, became effective September 10, 1952. Manufacturers have two alternative methods to use in computing their new ceiling prices. One method authorizes adjustments on the basis of individual items, which is largely for the small producer. The other method is primarily for large multi-line manufacturers maintaining several plants, who would find the first method too burdensome or difficult to apply.



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- MORE HOLE PER SHIFT with the *exclusive* "drill and blow" feature.
- REALLY LIGHTWEIGHT—only 750 lbs.—less than half the weight of conventional wagon drills.
- Easily operated by ONE MAN; mounts JOY 3" or 3½" drifters, or 55 or 65 lb. sinkers.
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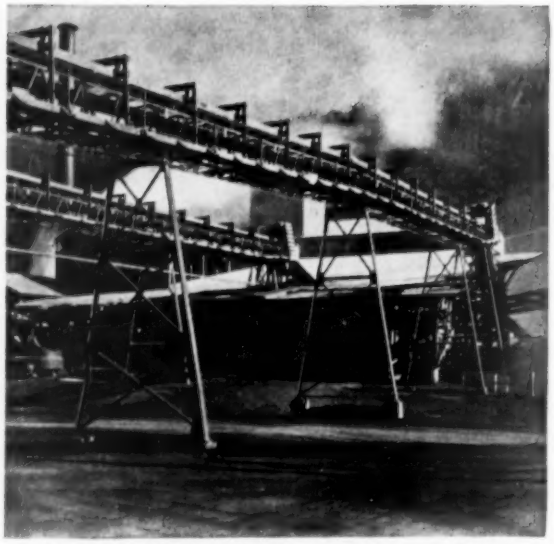

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Strongly Constructed

Here is the complete belt conveyor that will meet the requirements of both small and large operators handling bulk materials.

Easy to Assemble: Your own men can assemble, disassemble, move, extend or shorten it quickly and easily.

Take Your Choice: Select the right belt conveyor to fit your own particular needs—you have a choice of 3 types of drives—wide selection of intermediate truss lengths—your choice of idlers—(4", 5" or 6" diam.)—4 belt widths (18", 24", 30" or 36") in lengths up to belting limitations.

Factory-Assembled Units: All truss side members are factory-welded as complete units and are jig-drilled for easy erection—head and tail units completely assembled with machinery in place.

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Optional Equipment: Hood covers—easily attached loading hopper.

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STAMFORD CONNECTICUT

Hewitt Rubber Division
Hewitt Restfoam® Division
Robins Conveyors Division
Robins Engineers Division

X-Ray Spectrograms

(Continued from page 75)

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Crusher Repair

(Continued from page 89)

truding fill the holes in the plate and give additional strength in shear. The islands and the matching holes in the plate are also drilled, pinned and swedged similar to the outer contour of the lock. This type of repair is generally used in a weak casting where some advantage may be gained by utilizing the support of the parent metal more efficiently.

Metalace is the name of the repair used to seal cracks against leakage and lend rigidity to all Metalock repairs. Holes are drilled and tapped and "Metaloy" studs or dowels are screwed in tangent to each other along the line of fracture. These are then cold worked to insure tightness and the complete filling of the crack with new metal. Metalace is used in conjunction with Metalocks to accomplish a pressure tight joint and also to give rigidity to all Metalock repairs.

Metaloy is a name given to a series of high strength alloys that have a selective range of thermal expansion coefficients. Most corrosive and galvanic conditions (as well as temperature changes) can be met by one or more of this series of metals.

All jobs are guaranteed although the length of guarantee varies with the type of equipment and service. The Callanan crusher repair was guaranteed for one year. However, many jobs are unconditionally guaranteed for the life of the equipment. Each job is engineered to return the broken section back to its original strength or better. While often times a job looks simple on the surface, unforseen complications are often found when drilling for the locks. Many jobs are so repaired that a

broken section which has failed through poor designing is many times stronger than it was originally. Similarly, worn sections can be strengthened back to the original or better.

Such was the case with the No. 9 crusher. At each side of the crusher near the discharge chute, where three-fourths of the parent metal had worn away, 1½ in. thick Metalocks were set in above and below the crack. Heavy pieces of steel were then welded onto these locks, bridging the crack and imparting several thousand extra pounds of tensile strength to the crusher casting.

The swedging and peening of the pins, dowels and alloy metal not only sets these pieces firmly and securely but also compresses the cast iron. This compression definitely increases strength of the cast material.

This type of repair has been utilized in repairing other equipment found in and about quarries. Air compressor frames, diesel engines, motors, heavy steel shafts, turbines, and a host of other equipment have been successfully repaired.

Straight-Line Gravel Plant

(Continued from page 76)

ed gravel is made, along with a #6 gravel that is uncrushed. This latter material, termed pea gravel, is much used by concrete pipe and concrete block producers. When desiring to produce a #3 gravel and a #46 (plus ⅜ in. minus ¾ in.) simultaneously, it is necessary to change screens and run both crushers.

The crusher product is carried to the screening plant by a 24-in. x 118-ft. inclined belt conveyor. Two screens and four bins comprise the screening plant. Material is first discharged onto a 4- x 10-ft. double-deck Simplicity screen operating wet, above a 100-ton capacity shipping bin. The size produced by this screen is #6. Wash water from this screen is flumed to a short (8 ft.) sand screw for recovery of filter sand. This "no-fines" sand is carried over principally from the crushers. When the plant was first designed the wash water from the vibrating screen was wasted. When it was found that the discharge line was sanding up with a coarse product, investigation proved that a valuable filter sand was being lost. The sand screw and bin were then added.

Oversize from the top deck of the wet screen is sized further on a 4- x 8-ft. double-deck Ty-Rock screen, operating dry. One of the principal functions of this unit is to scalp off flats which have passed through the crushers and gone over to the other screens. These rejects are collected in a small 10-ton capacity bin and periodically dumped. This screen also effects a size separation, making #3 material which drops into another 50-ton capacity shipping bin and also #4 gravel.

Deposit

The deposit covers 35-40 acres and ranges from 32-34 ft. deep below the average 4 ft. of overburden. The bank is about half sand and half gravel. A Lima #101 diesel-powered shovel is used in the pit to load two L-172 International 2-cu. yd. trucks. These are sufficient to keep the plant at full capacity. The haul is ¼ mile round trip, up grades, however, that reach 10 percent.

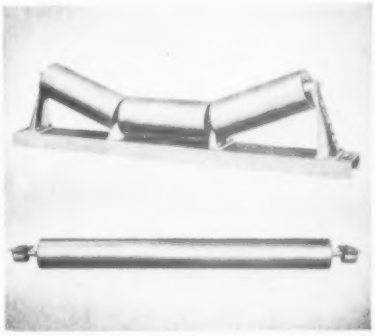
An interesting feature of the excavating is the use of a 1¼-cu. yd. wide mouth coal bucket on the shovel. The operators have found that by using this it is possible to gauge a bite to prevent bank cave-ins. A second advantage is that the bucket doesn't have to be raised as high to extend over a truck bed. This type of bucket is equipped with more teeth than the conventional bucket.

A screen analysis shows:

97	percent passing # 4 screen
84.2	percent passing # 8 screen
70.2	percent passing # 16 screen
53.8	percent passing # 30 screen
17.4	percent passing # 50 screen
3	percent passing #100 screen

A 1¼-cu. yd. coal bucket is used for pit excavation. Haul to plant is ¼-mile round trip, so two trucks are sufficient to keep production at full capacity

HEWITT



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More features: Sturdy construction assured by Channel Base, Rigid Truss design—One-Shot Lubrication from either side—Triple Grease Seal—over-sized bearings.

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CF&I Grinding Rods are rolled from special analysis steel — machine straightened with square cut ends. They minimize tramp oversize . . . resist abrasion and wear evenly to provide efficient, economical grinding.

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CF&I GRINDING RODS
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1046

The deposit is rather dirty and contains some clay and shale. The sand and the gravel are high in silica. Hand picking is still necessary to eliminate the shale, however. This is done at two places; on the conveyor belt carrying material from the rotary scrubber, and from the top deck of the first vibrating screen (Deister).

Water Supply

The Muskingum river, flowing half a mile from the plant, is the source of water. A 1000 g.p.m. Fairbanks-Morse 5-in. single-stage centrifugal pump is used. An 8-in. line carries water to the plant. Waste water is allowed to seep back to the river, settling fines in the process. Wash water is used at three points—the rotary scrubber, sand drag, and 4- x 10-ft. vibrating screen (Simplicity).

Shipping

All shipments within 50 miles of the plant are by truck. A 50-ft. platform scale speeds up shipments. This is a Fairbanks-Morse unit. Some extra business has resulted specifically because of this scale, which is large enough to accommodate large trucks in one weighing operation. The contract truckers like this arrangement because it speeds up weighing, permitting them to haul one or two more loads a day than could be handled with the formerly used short scale platform.

Rail shipments are handled at a siding 5 miles away, where the company's exhausted pit stands. A ramp there enables trucks to load cars directly.

Personnel

President of Zanesville Gravel Co. is J. J. Gorman, Sr. Mrs. Kathryn T. Gorman is vice-president, and Mr. Gorman's son, J. J. Gorman, Jr., is secretary-treasurer. The company office is in Zanesville. E. A. Wine is superintendent of the Dresden plant, and Carlos Keyes is chief engineer.

Cement Plant Dust Basis for Injunction

A COMPLAINT against Idaho Portland Cement Co.'s Inkom, Idaho, plant reportedly has been filed in district court by six Inkom residents, seeking an injunction to restrain the company from further operations.

The suit alleges that dust, vapor and cement-impregnated fumes from the company's stacks damages property, farm and fruit crops, and threaten the health of Inkom residents. It was further alleged that the smoke and fumes are gradually destroying roofs of houses and buildings and their painted surfaces, as well as the finish on motor vehicles, and that the alleged "nuisance" has denied Inkom residents "comfortable enjoyment of living." Besides the six plaintiffs, 61 other residents signed an affidavit complaining the plant is a nuisance.

Allis-Chalmers HD-20 Tractor

gives HIGHER OUTPUT with LESS UPKEEP

Exclusive Hydraulic Torque Converter Drive is One BIG Reason Why

The hydraulic torque converter drive, *exclusive* in the Allis-Chalmers HD-20 Tractor, brings you productivity, handling ease and dependability that makes every hour, every day of the season count . . . gives the operator the equivalent of hundreds of gear ratios in two speed ranges . . . automatically selects the proper speed for maximum production.

DOZING With hydraulic torque converter drive you take full advantage of available horsepower . . . you'll roll bigger loads, tackle tougher dozing jobs. Master clutch engages under cushioned protection, yet power is achieved *instantly* with velvet-like smoothness. This means fewer repairs . . . longer life of tractor and auxiliary equipment.

PULLING There's nothing like the HD-20 for sheer productive power. Torque converter actually multiplies torque up to four and one-half times . . . develops tremendous drawbar pull to start the load smoothly, and automatically accelerates to highest speed conditions permit, in either high or low range.

EXCAVATING With full horsepower available even at creeping speed, and shifting virtually eliminated, the operator can concentrate on his front-end shovel completely . . . crowd surely and steadily . . . start and stop with a touch of the throttle.

PUSHING The HD-20 makes smoother contact, automatically matches speed to pushed equipment, maintains steady contact while loading, sends load off to the fill in a higher speed.

Get the full story now from your Allis-Chalmers dealer. See why the HD-20 does more work, more easily, at less cost . . . and why it is worth waiting for.

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175 Net hp. at flywheel

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Discontinues Operations

UNITED FELDSPAR AND MINERALS CORP., New York, N.Y., recently announced that it does not plan to rebuild its Spruce Pine, N.C., plant which was destroyed by fire several months ago at a loss of approximately $100,000. The company will continue operations of its pyrophyllite mines and plants at Staley, Glendon and Stem, N.C.

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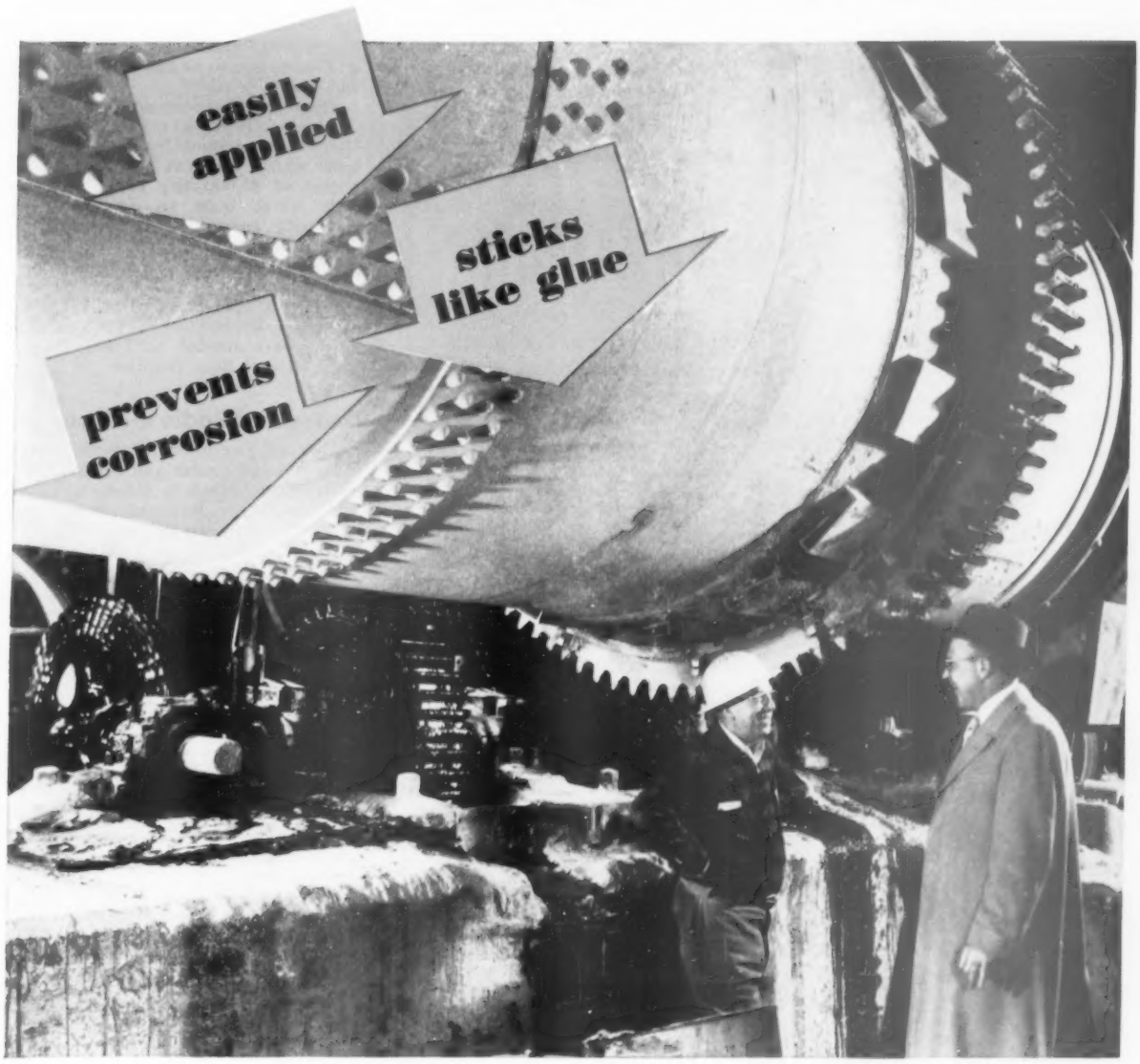

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NO!

Here, conventional U-Bolt clips are properly applied but rope is distorted and subject to life-shortening strains under load.

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Both halves of the Laughlin Safety "Fist Grip"* clip are identical. There is no wrong way. The most careless workman can't put 'em on wrong (unless he forgets to tighten the nuts). And they're not only safer and practically foolproof, but they're a darn sight easier to use.

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"Fist-Grip" Clips are just one example of many LAUGHLIN EXCLUSIVES in design, safety and quality that make Laughlin your best buy in wire rope and chain fittings.

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*Patented, T.M. Reg.

Roads for Atomic Plant

THE RESULTS of a survey of highway needs in southern Ohio to accommodate the construction and operation of the new atomic plant to be built in Pike county were recently announced by S. O. Linzell, highway director, who estimated the immediate cost for such construction to be $18,000,000, with a possible ultimate of $38,000,000 to be spent in the next five years.

The road requirements were outlined as follows: (1) 13 projects of "immediate urgency," required to be built within the next 6-12 months at a cost of $3,000,000; (2) nine projects which must be completed by the early summer of 1954, totaling $15,000,000; and (3) ten additional projects which will be required to accommodate the plant's traffic during permanent operations after 1957, at a cost of $20,000,000. These projects cover work needed in Pike, Scioto, Jackson and Ross counties.

Industrial Radio Licenses

DUE TO THE GROWING INTEREST in the sand and gravel and ready-mixed concrete industries in industrial radio facilities, the National Sand and Gravel Association and the National Ready Mixed Concrete Association recently issued a memorandum, prepared by their general counsel, to inform member companies of recent developments regarding the issuance of industrial radio licenses.

The memorandum announces that the Federal Communications Commission is preparing to issue new regulations governing industrial radio service which carry the potential threat of invalidating existing licenses. No decision has been made as to what will be done in regard to existing facilities which may be found ineligible under the new regulations, but it is possible that the facilities will be continued. At least it is believed that if they are not continued, the individual licensee will be able to amortize whatever loss he may suffer.

Until the end of May, 1952, the operation of industrial radio has been restricted by the stipulation that it must be limited to communications "necessary to the performance of construction work for government agencies or public utilities." Compliance with the restriction was left to the individual licensee. Since the end of May, however, the Commission has been denying licenses to applicants who intend to operate in standard metropolitan areas of 250,000 or more people. This figure was chosen arbitrarily and may be revised upward or downward as subsequent conditions indicate. Thus, if an applicant wishes a license in the Special Industrial Service, to be used in a county included in a standard metropolitan area, his application will be denied. It is possible in some cases, however,

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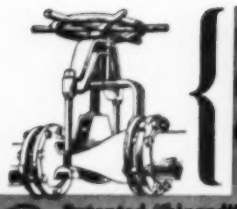

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on a special showing by an applicant, to obtain facilities in the Special Industrial Service if the applicant's operation is to be conducted in a particular, sparsely-settled section of a standard metropolitan area, even though that area has a population of 250,000 or more persons. When a license is issued in a standard metropolitan area with a population of less than 250,000, there are no restrictions imposed on the operation of radio facilities by the licensee.

The memorandum advises licensees, now possessing facilities in the Special Industrial Service, who are not in standard metropolitan areas of more than 250,000 population, to file with the Commission a Request for Modification of License, Form No. 403, setting forth the licensee's position and requesting that the existing restriction on his operation be officially removed.

STATEMENT REQUIRED BY THE ACT OF AUGUST 24, 1912, AS AMENDED BY THE ACTS OF MARCH 3, 1933, AND JULY 2, 1946 (Title 39, United States Code, Section 233) SHOWING THE OWNERSHIP, MANAGEMENT, AND CIRCULATION OF

ROCK PRODUCTS, published monthly at Chicago, Ill., for October 1, 1952.

1. The names and addresses of the publisher, editor, managing editor, and business managers are:

Publisher—Maclean-Hunter Publishing Corp., 309 W. Jackson Blvd., Chicago 6, Ill.

Editor—Bror Nordberg, 309 W. Jackson Blvd., Chicago 6, Ill.

Managing Editor—None.

Business Manager—E. R. Gauley, 309 W. Jackson Blvd., Chicago 6, Ill.

2. The owner is: (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding 1 percent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a partnership or other unincorporated firm, its name and address, as well as that of each individual member, must be given.)

Maclean-Hunter Publishing Corp., 309 W. Jackson Blvd., Chicago 6, Ill. The stockholders of the Maclean-Hunter Publishing Corp. are E. R. Gauley, 3867 Pratt Blvd., Lincolnwood, Ill.; R. K. Davis, 6920 S. Green St., Chicago 21, Ill.; F. S. Chalmers, 86 Chestnut Park, Toronto, Ont., Canada; Horace T. Hunter, 120 Inglewood Drive, Toronto, Ont., Canada; Maclean-Hunter Publishing Co., Ltd., 481 University Ave., Toronto, Ont., Canada.

3. The known bondholders, mortgagees, and other security holders owning or holding 1 percent or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state.)

None.

4. Paragraphs 2 and 3 include, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting; also the statements in the two paragraphs show the affiant's full knowledge and belief as to the circumstances and conditions under which the stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner.

5. The average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the 12 months preceding the date shown above was: (This information is required from daily, weekly, semiweekly, and triweekly newspapers only.) . . .

E. R. Gauley,
Business Manager

Sworn to and subscribed before me
this 23rd day of September, 1952

[SEAL]

Clara M. Brockschmidt
(My commission expires March 13, 1956.)

"EUCS" Are Your Best Bet!

FOR BIG LOADS

FOR LONG HAULS

FOR SHORT HAULS

FOR LASTING STRENGTH

Because of their rugged construction and dependable performance, Rear-Dump Euclids are standard equipment on hundreds of mine, quarry, and construction jobs. For moving rock, ore, overburden and other heavy excavation, "Eucs" have the capacity and speed to haul bigger loads faster and at lower cost per ton or yard moved.

Look at the record! Of the thousands built, nine out of eleven Euclids are still in use today! They're job proved . . . have earned their reputation for staying power, low-cost production and efficient operation on a wide range of work.

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Euclids are your best bet for more loads per hour and more profit per load. Write for information on the complete line of Euclid equipment, or call your Euclid Distributor today.

The EUCLID ROAD MACHINERY Co., CLEVELAND 17, OHIO

EUCLIDS *Move the Earth*

STEEL

Prompt Delivery from Stock

Some steel products are in short supply but our over-all stocks are still large

Plates, Structurals, Bars, Sheets, Tubes, etc. Carbon, Alloy, Stainless Steels, Babbitt Metal.

RYERSON

Joseph T. Ryerson & Son, Inc. Plants: New York, Boston, Philadelphia, Detroit, Cincinnati, Cleveland, Pittsburgh, Buffalo, Chicago, Milwaukee, St. Louis, Los Angeles, San Francisco, Seattle, Spokane

Defluorinated Phosphate

INTERNATIONAL MINERALS AND CHEMICAL CORP., Chicago, Ill., will open its new $10,000,000 plant at Bartow, Fla., by next February, to produce defluorinated phosphate for animal feed and multiple superphosphate for the chemical fertilizer industry. Uranium will be recovered as a by-product.

Consumption of Liming Materials

THE APPROXIMATE CONSUMPTION of liming materials on United States farms in 1951 has been listed by the National Lime Association as follows:

Agricultural limestone	25,089,300 tons
Burned lime	138,000 tons
Hydrated lime	201,700 tons
Marl	488,000 tons
Miscellaneous materials	668,000 tons
Total liming materials	26,585,000 tons
Lime oxides	13,253,630 tons

New Lightweight Aggregate

A NEW BUILDING MATERIAL with many potential applications was recently demonstrated at Armour Research Foundation of Illinois Institute of Technology. Trade-named "Kanamite" by Kanium Corp., Chicago, Ill., which sponsored the development work at the Foundation, the material is a fine-grained lightweight aggregate, made by expanding individual grains of clay in a special furnace.

Concrete mixes using the new material in place of sand or other aggregate are said to be very fluid, even though the water content is low. This fluidity means, according to John Neff, assistant chairman of the ceramics and minerals research department, that contractors, for the first time in building history, can fill forms with concrete pumped through rubber hoses. Concrete, mortar and plaster made with this material are also claimed to have high strength and good insulating qualities, in addition to being lightweight.

Individual particles of the material are almost spherical, varying in size from about $\frac{3}{16}$ in. down to .0024 in., and resemble tiny glass balloons. Ground and screened clay is fed into the top of a vertical furnace. The individual grains of the raw material melt as they drop through the 2700 deg. F. gas-air flame. Gases given off by the tiny melted blobs inflate them into hollow spheres.

In addition to its use in concrete, mortar and plaster mixes, other potential applications of the product include its possible use in lightweight refractories and high-temperature insulating materials and as a filler in road-building materials and plastics.

A semi-production plant in Blue Island, Ill., was completed this year and is now producing the aggregate. The plant also serves as an extension of the Foundation's laboratories for continued improvement of the process.

THERE'S MORE THAN MEETS THE EYE IN

HAMMOND *Multi-Wall* BAGS

★ HIGHEST QUALITY PAPERS AND MATERIALS

★ MODERN MACHINES—SKILLED PERSONNEL

★ EFFICIENT PLANT OPERATIONS

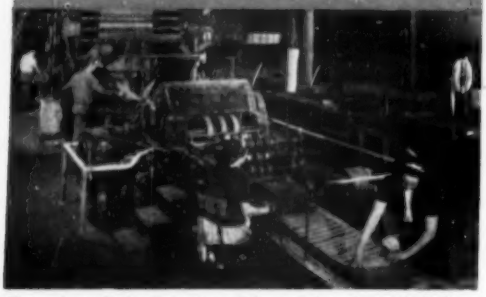


Photo shows "tubes" coming off large tuber, from which they are conveyed to sewing machines, where they are made into *Sewn Type* Multi-Walls.

Satisfied customers in the cement and rock products industries know that all multi-wall bags are not alike. The combined efforts of progressive management, conscientious and thoroughly trained personnel, and expert sales engineers who thoroughly understand the problems of shipping hundreds of products—are the primary reasons for the superiority of Hammond Multi-Wall Bags. *Write for booklet—"To Serve You Better with Hammond Multi-Wall Bags."*

HAMMOND BAG & PAPER COMPANY

***General Offices:* Wellsburg, W. Va.**

***Plants in* Wellsburg, W. Va. and Pine Bluff, Ark.**

Representatives in the following cities:

For Making Light-Weight Aggregate in CALIFORNIA...

they'll rely on these Vulcan ROTARY KILNS

At what may be the largest plant in the world devoted exclusively to the production of light-weight aggregate, the Basalt Rock Corporation of Napa, California, has recently installed four Vulcan Continuous Rotary Kilns, each 8 ft. in diameter by 125 ft. in length. All four shells were shipped as shown in the illustration above —with the two cast-steel tires in position and a supporting rolled-steel flange on each shell: ready to receive a cast-steel ring gear with machine-cut teeth.

Efficient, economical, production of high-grade light-weight aggregate requires that the kiln, or kilns, be designed to provide the correct temperature range, and the correct rate of travel, for the material to be expanded. Vulcan engineers have been highly successful in this relatively new field and welcome opportunities to submit designs and proposals based on results already obtained under a wide variety of operating conditions and requirements. No obligation unless, or until, our proposals are accepted.

THIS BOOKLET MAY SAVE YOU MANY HOURS OF PRECIOUS WORKING TIME

It tells how to keep kilns running when trouble occurs—either permanently or until replacement parts can be secured. Better still, it tells how to PREVENT TROUBLE through proper precautions during installation and by watching out for conditions which may cause trouble if not corrected in time. Free on request to any one who can use it to advantage. Ask for Bulletin No. 389.

VULCAN IRON WORKS

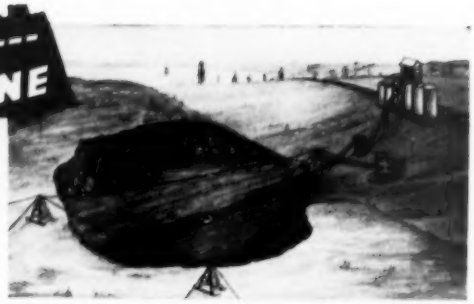
Established 1849

Main Office and Works **WILKES-BARRE, PA.,** New York Office 50 Church

Rotary Kilns, Coolers and Dryers	Double-Roll Briquetting Machines	Heavy-Duty Electric Hoists	Steam Locomotives
Rotary Retorts, Calciners, Etc.	Open-Hearth Steel Castings	Self-Contained Electric Hoists	Diesel and Gasoline Locomotives
Improved Vertical Lime Kilns	Steel-Plate Fabrication	Scraper-Loading Hoists	Diesel-Electric Locomotives
Automatic Quick-Lime Hydrators	Shaking-Chute and Chain Conveyors	Cast-Steel Sheaves and Gears	Electric Locomotives and Larrys

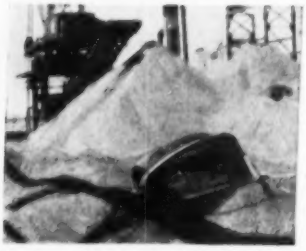
ONE MAN----- ONE MACHINE

VERSATILE
EFFICIENT
ECONOMICAL



Picture shows how a Sauerman Drag Scraper equipped for rapid shifting makes fast work of cutting down a large hill of hard-packed gravel.

SAUERMAN SCRAPER

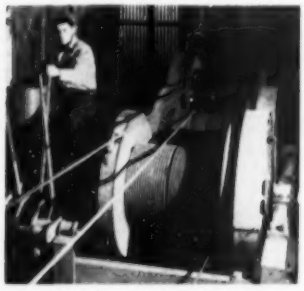


Sauerman Scraper stores and reclaims 150,000 tons of crushed stone on space between dock and cement mill.

VERSATILE: The Sauerman Power Drag Scraper can be readily set up for stripping of overburden, wet or dry excavation of aggregate, haulage to plant or stockpile, and loading for storage or delivery. Even on the most difficult jobs, only one man is required to dig, haul, stockpile or load in one continuous cycle. Bucket sizes 1/3- to 15-cu. yds.

EFFICIENT: Finger-tip controlled from a safe, comfortable operating station, the scraper is easily guided over a large area. The unique bottomless Crescent scraper readily penetrates hard materials, gathers full load, hauls speedily to the discharge point, and dumps cleanly and quickly. Depending on the length of the span, 20 to more than 40 loads can be moved per hour.

ECONOMICAL: Labor and equipment is reduced to a minimum by using the Sauerman Scraper. Installation is moderate in cost. Simplicity of design, plus the fact that only the most expendable parts come in contact with the material handled, results in low maintenance. Gasoline, diesel, or electric power consumption is light.



Operation of a Sauerman Scraper machine is an easy one-man job because of the unique Sauerman roller bearing scraper hoist.

For Complete facts send for Catalog A.

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Farrel-Bacon provides a complete engineering service, including design of plant and supplying all equipment from primary crusher to bin gate. Jaw-type crushers are available in sizes from 60" x 48" to 10" x 7". *Write for complete information.*

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ANSONIA, CONNECTICUT

BA 5

MANUFACTURERS NEWS

Baughman Mfg. Co., Jerseyville, Ill., announces that James E. Cadle has been appointed sales manager. He was formerly plant manager. F. Michael Hanlon has been named division manager of the Western division. He was formerly St. Louis representative for the Mobilift Corp.

Detroit Diesel Engine Div. of General Motors Corp., Detroit, Mich., has appointed Eugene K. Cook and William R. Bays as supervisors of distributor and dealer sales in two midwestern zones with headquarters in Detroit, Mich., and Lincoln, Neb., respectively.

Thermoid Co., Trenton, N.J., has announced the election of George S. Fabel as president of the company. He was formerly vice-president and succeeds Fred E. Schluter who has resigned but will continue on the board of directors. Mr. Fabel joined the company over 30 years ago in the factory of the molded rubber goods department. He later transferred to sales where he was associated with the automotive replacement and industrial rubber divisions. In 1930 he was appointed vice-president and general manager of the Southern Asbestos Co., a subsidiary, at Charlotte, N.C., and became president of the subsidiary and a director of Thermoid in 1939. He has been a vice-president of the company since spring of this year.

George S. Fabel

Easton Car & Construction Co., Easton, Penn., has announced the death on September 11 of Joseph Carcione, purchasing agent, at Maniwaki, Quebec, Canada, where he had been spending a week fishing with a group of friends. He was 47 years old and had been purchasing agent for 18 years.

Alloy Rods Co., York, Penn., has appointed F. L. Blodgett as assistant general sales manager, according to an announcement by E. R. Walsh III, general sales manager. Mr. Blodgett was formerly manager of the hard facing division. He has been associated with the welding industry for the past 15 years. In his new position he will be concerned with national distributor activities and the merchandising and advertising programs of the company. His headquarters will be at the factory in York, Penn.

F. L. Blodgett

You'll strike "PAY DIRT" every time with a WEMCO SAND PREPARATION MACHINE!

A **WEMCO** machine at work is like money in the bank. Unfailingly — at **lowest** per ton costs — it produces the kind of high profit specification sands that meet today's demands for sharp sand gradation, washing, dewatering and desliming.

Proof of **WEMCO** performance is to be found **on the job**. Every day operators are demonstrating the ability of **WEMCO** machines to get a greater production of clean, dry specification sands at lower per ton costs than is possible with any other equipment.

The ability of a **WEMCO** machine to produce clean, dry specification sands at lower costs is the result of these features:

- *large settling area*
- *wide overflow weir capacity*
- *high raking capacity*
- *sharp size separations*
- *low maintenance costs*
- *low horsepower*
- *minimum attendance requirements*

PROVE WEMCO YOURSELF! *Whatever your sand washing problem may be,* **WEMCO** *can help you get more specification sands at lower cost.* **Write WEMCO** *— 766 Folsom Street, for Bulletin XC-1-0-2 and engineering recommendations — no obligation, of course.*

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WESTERN MACHINERY COMPANY
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- Fraser & Chalmers (S.A.) Ltd., P.O. Box 619, Johannesburg, South Africa
- Lilestone & Co., Inc., P.O. Box 3368, Manila, Philippines
- United Development Corporation Pty Ltd., P.O. Box 3460, Sydney, N.S.W., Australia
- Corporation Commercial Sudamericana S.A., Casilla 505, Lima, Peru

Allis-Chalmers Mfg. Co., Milwaukee, Wis., has officially acquired all property of the LaPlant-Choate Mfg. Co., Cedar Rapids, Iowa, according to an announcement by W. A. Roberts, president of A-C, and has started operating as the Cedar Rapids works of the tractor division. A. D. Dennis, president of LaPlant-Choate, is general manager, Wallace Gates is works manager and H. W. Rockwell is chief engineer. W. G. Scholl is vice-president in charge of the tractor division.

Left to right: W. E. Hawkinson, A-C financial vice-president; A. D. Dennis, president of LaPlant-Choate and now general manager of the Cedar Rapids works; W. G. Scholl, vice-president in charge of A-C tractor division; and John Ernst, vice-president of manufacturing, A-C tractor division

White Motor Co., Cleveland, Ohio, has announced the appointment of H. R. Stickel as assistant to the president in charge of public relations and national fleet sales. He has been fleet sales manager for the past seven years.

The Oliver Corp., Chicago, Ill., has announced that E. H. Fisher, general manager of the recently acquired A. B. Farquhar Division in York, Penn., has been appointed director of marketing, with headquarters in Chicago, where he will assume general supervision over market research, advertising, sales promotion, sales training and product specification. S. W. White, Jr., of the general sales department in Chicago, has been placed in charge of market research, and J. O. Cunningham, formerly merchandising department manager, has been named advertising manager. Frank J. Zielsdorf has been named to succeed Mr. Fisher as general manager at York, Penn. He was formerly manager of the Springfield, Ohio, plant, and will be succeeded in this position by C. W. Thornell, formerly superintendent of the plant in South Bend, Ind.

Thermoid Co., Trenton, N.J., announces that T. J. Ellis, formerly factory superintendent, has been elected a vice-president of the company. Mr. Ellis has been associated with the rubber industry since 1925, when he joined the Firestone Industrial Products Co. of the Firestone Tire & Rubber Co. He has been a member of the Thermoid organization since 1949 when he started as factory superintendent.

Stoody Co., Whittier, Calif., has appointed the following distributors: Anderson Welding Supply Co., Aberdeen, S.D., covering the northern portion of South Dakota and the counties of Sioux, McIntosh and Dickey in North Dakota; Dakota Welding Supply Co., Inc., Watertown, S.D., in the central and northeast portions of South Dakota and a portion of western Minnesota; Beaumont Oxygen Co., Beaumont, Texas, in the southeast portion of Texas and southwest section of Louisiana; Welders Supply Co., Lubbock, Texas, covering the counties of Dawson, Gaines, Hockley, Lubbock, Lynn, Terry and Yoakum; and Western Welding Supply, Snyder, Texas, in counties of Borden, Cockran, Garza, Hockley, Kent, Lubbock and Scurry.

The Heil Co., Milwaukee, Wis., has appointed Joseph F. Heil, Jr., as special sales representative. Part of his duties will be to coordinate activities and methods of operation of all field offices; set up and conduct a training course for Milwaukee sales office personnel; and coordinate long range planning and sales objective programs with field offices.

Hewitt-Robins, Inc., Stamford, Conn., has announced the appointment of Edward Lebo as public relations director, with headquarters in Stamford. He was formerly assistant director of public relations of the United States Rubber Co.

Lull Mfg. Co. Minneapolis, Minn., announces that Fred W. Hartlage has been promoted to advertising manager to succeed Charles Strauch, who has been appointed sales promotion manager. David Hansen has been named assistant sales manager. Mr. Hartlage was formerly in charge of the preparation of technical publications. He will now direct the advertising activities of the company, including national, regional and direct-mail advertising as well as publicity activities. He joined the company in 1951, leaving a position with the United States Air Force. Prior to that he was with the Minneapolis-Honeywell Regulator Co.

Fred W. Hartlage

David Hansen

Mr. Hansen was formerly district representative for the J. I. Case Co., in Minnesota, North Dakota, South Dakota, and the Canadian provinces of Saskatchewan, Manitoba and western Ontario. In his new position his duties will include the promotion and sales of Shoveloaders, Traveloaders, Tractor-Shoveloaders and Sweepers.

ON BIG OR SMALL SCREENING JOBS — YOU CAN'T GO WRONG WITH UNIVERSALS!

They've been setting the pace for efficiency and economy for over 30 years.

Whether your plant capacity is 10 or 1000 tons per day, UNIVERSALS are ideal to standardize on. They're rugged, simple in design and flexible in handling stone, sand and gravel with equal efficiency.

Type "MR" 3½' x 8' double-deck

Type "C" 3' x 5' single-deck

Prices and delivery on these dependable Vibrators will surprise you. Write for Catalog No. 109 on Screens and Screening today!

UNIVERSAL VIBRATING SCREEN CO.

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BOGGED DOWN WITH HIGH HAULING COSTS?

LANDIS TRAILERS are your answer! Many revolutionary changes, including *smooth* surface bed that eliminates load-hanging, gives lower-cost operation. LANDIS owners have discovered that safe, positive connection to end, side or bottom dump trailers means added versatility — bigger, better jobs, but no more cost! LANDIS TRAILERS in your fleet get you "out from under" excessive costs!

Model illustrated: Side-dump, down-folding door. 8 cu. yd. capacity. Twin hydraulic hoists raise bed to dumping angle of 55 degrees. Bottom is ¼" plate, with liner of 2" of oak and ⅜" steel wear plate. This unit is designed for rough working conditions, such as mine or quarry duty.

LANDIS 12 yard on-or-off the road bottom Air-dump trailer, illustrated above: 20' 3" overall length. 7' height, 8' overall width. Door openings—2 doors 18½" x 8' 4", gravity opened, air closed from truck cab. Specially designed for fine materials. Sides and bottom—3/6" high tensile steel.

ON - OR - OFF THE ROAD

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MEAN LOW COST HAULING!

Write or call today for information on the engineer-designed trailer for *your* hauling!

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- ___Asphalt Mixing Plants
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- ___Bags
- ___Barges
- ___Batchers
- ___Belting, Conveyor, Elevator, Power Transmission
- ___Belting, V-Type
- ___Belt Repair Equipment
- ___Bin Level Indicators
- ___Bins and Batching Equipment
- ___Blasting Supplies
- ___Block Machines Concrete Building
- ___Bodies, Trailer
- ___Brick Machines and Molds
- ___Buckets
- ___Bulldozers
- ___Cars, Industrial
- ___Classifiers
- ___Clutches
- ___Coal Pulverizing Equipment
- ___Concentrating Tables
- ___Concrete Mixers
- ___Concrete Mixing Plants
- ___Concrete Specialty Molds
- ___Concrete Waterproofing and Dampproofing
- ___Conveyors
- ___Crushers
- ___Coolers
- ___Cranes
- ___Derricks
- ___Dewatering Equipment, Sand
- ___Diesel Engines
- ___Dragline Cableway Excavators
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RP-11

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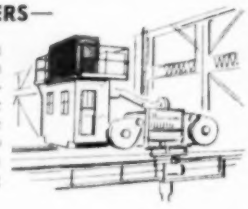
No matter what radical temperature variations or atmospheric conditions occur in your industry, there's a Dravo Crane Cab Cooler or Conditioner available to protect your crane cab operator, safeguard his health, increase his efficiency and alertness, and improve safety and production records in your operations.

Dravo Crane Cab Coolers and Conditioners provide complete air conditioning, filter the air, remove dusts, dirt and fumes; heat the cab in winter, cool it in summer and provide constant ventilation the year around.

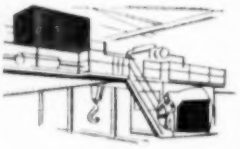
SELF-CONTAINED COOLERS—

Mounted alongside the cab or on the cab roof. Only electrical leads and connections required. Thermostat control—fully automatic—maintains 85° F. temperature with ambient temperatures up to 225° F. Ideal for "hot spots" in steel and other metal-working industries.



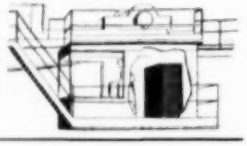
SPLIT-TYPE COOLERS—

Installed on the crane in two sections—the heavy condenser unit *on the crane* wherever you want it—the light cooling section *in the cab* with the operator. Two sections joined only with refrigerant pipe and electrical connections.



SMALL HEATERS AND VENTILATORS—

Especially designed to filter dusts and dirt, remove fumes, provide constant ventilation, supply heat in winter. Ideal for cranes in quarrying, slag, cement and similar industries.



One source of supply—Easy Installation

Dravo is your *one source of supply* for all crane cab coolers and conditioners. Units are quickly and easily installed with a minimum of downtime required. Parts are interchangeable on all units.

Available for immediate delivery

No delays in getting the units you want. For more information write for a complete catalog—or phone your nearest Dravo sales office and have our representative call on you.

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For Heavy Conveyor Belts of changing length

These heavy-duty belt fasteners make a strong, flexible joint in conveyor belts, belts of any width and of from 3/8" to 1/2" thickness. They offer special advantages in mines, quarries or industrial set-ups where length or position of belt is frequently changed, because sections can be removed or added at will. Joints are opened for this purpose by simply pulling out the hinge pin.

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The new WILFLEY MODEL K Centrifugal Sand Pump embodies important mechanical improvements especially adapted to the handling of cement slurry and results in stepped-up production and substantial power savings. Individual engineering. Write for details.

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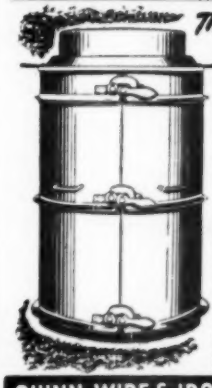
The "Quinn Standard" FOR CONCRETE PIPE



The Quinn Standard is known as the best the world over, wherever concrete pipe is produced and used. Backed by over 35 years' service in the hands of hundreds of Quinn-educated contractors, municipal departments and pipe manufacturers who know from experience that **Quinn pipe forms** and **Quinn mixing formulas** combine to produce the finest concrete pipe at lowest cost.

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For making pipe by hand methods by either the wet or semi-dry processes. Built to give more years of service—sizes for pipe from 10" up to 120" and larger—tongue and groove or bell end pipe at lowest cost.

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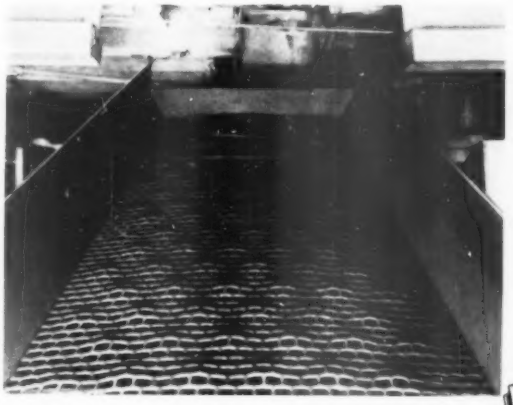
QUINN WIRE & IRON WORKS 1603 12"ST. BOONE, IOWA

The mesh stays uniform...

throughout the life of the screen



When Hendrick Perforated Plate is used on vibrating and shaking screens, not only does the mesh remain uniform throughout the life of the screen, but the screen gives economically long service.

Furnished either flat or corrugated, its full clearance practically obviates clogging, and the ease with which decks can be changed minimizes labor costs.

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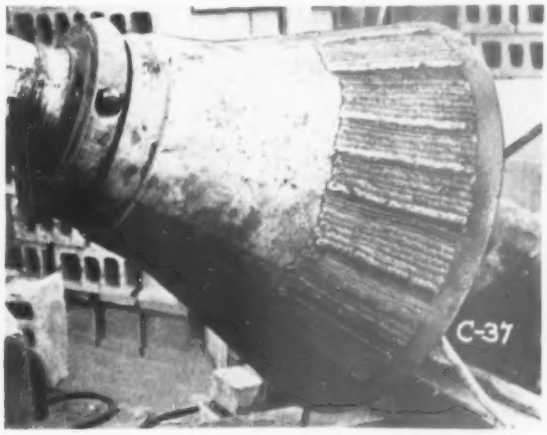

Before and After Applying N. M. MANGATONE and RESISTO-LOY

This rebuilding job on Gyratory Liners was accomplished economically despite the fact that well over an inch of deposited metal was required all around the bottom third. Note the very badly worn areas in the "before" picture. Then note the perfectly done, finished job.

This rebuilding was done by the plant maintenance welder, using our N.M. Mangatone to rebuild the liner and making the last pass over the lower 15 inches with Resisto-Loy. This final coating pays a fine dividend in additional wear resistance.

Why not put in a call for our field man? He can show you many ways to save materials and money.

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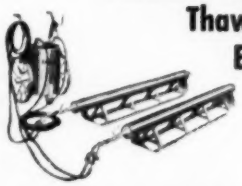

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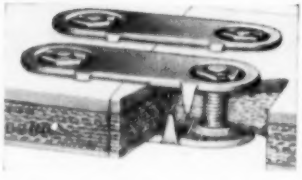

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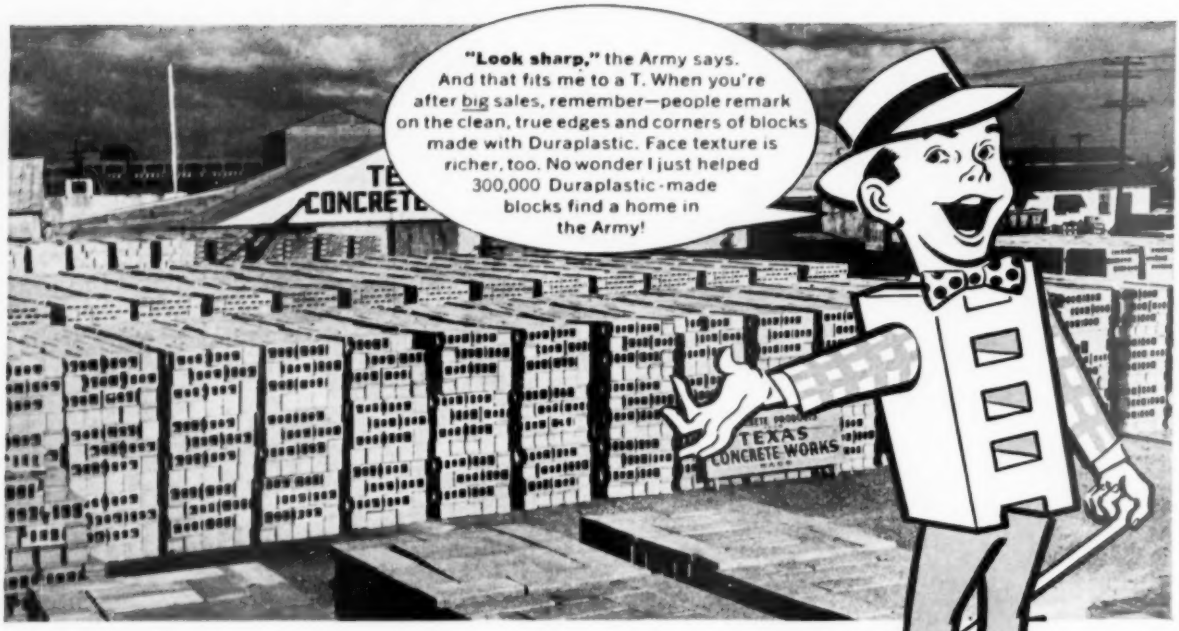
CONCRETE UNITS · READY-MIXED CONCRETE

Basalt Rock Co.'s new research laboratory at Napa, Calif.

"NIFTY" tells how to make a 300,000-block sale!


"Look sharp," the Army says. And that fits me to a T. When you're after big sales, remember—people remark on the clean, true edges and corners of blocks made with Duraplastic. Face texture is richer, too. No wonder I just helped 300,000 Duraplastic-made blocks find a home in the Army!
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"Thrifty" says:

I can help you save a pretty penny on production. Fewer culls and throwbacks... less breakage in handling green products all add up. Manufacturers report real savings with Duraplastic.

WHEN the Texas Concrete Works at Waco landed a whopping order for 300,000 concrete blocks for Ft. Hood, it wasn't surprising. They use Atlas Duraplastic Cement exclusively, manufacturing blocks and pipe. And they know Duraplastic makes better-looking concrete products with increased resistance to passage of water.

YOU'LL FIND—Duraplastic Cement makes a more cohesive, rubbery mix which holds together better, feeds easily through machines. Unsurpassed for concrete block, brick, pipe, drain tile and silo staves.

YET DURAPLASTIC* COSTS NO MORE

OFFICES: *Albany, Birmingham, Boston, Chicago, Dayton, Kansas City, Minneapolis, New York, Philadelphia, Pittsburgh, St. Louis, Waco.*

It sells at the same price as regular cement and requires no unusual changes in procedure. Complies with ASTM and Federal Specifications. For descriptive booklet, write Universal Atlas Cement Company (United States Steel Corporation Subsidiary), 100 Park Avenue, New York 17, N. Y.

*"Duraplastic" is the registered trade mark of the air-entraining portland cement manufactured by Universal Atlas Cement Company

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INDUSTRY NEWS

Concrete Ceiling Prices

NATIONAL READY MIXED CONCRETE ASSOCIATION advised its member companies in Executive Letter No. 712 that, contrary to what seemed to them to be the plain meaning of the language in Section 9 of the General Ceiling Price Regulation, a ready-mixed concrete producer who performed a heating service in the base period which was part of his ceiling price, would have to adjust his ceiling price whenever the heating service was not performed.

N.R.M.C.A. felt that the meaning of Section 9 was that a ready-mixed concrete producer's ceiling price was the highest price which he charged in the base period, with the advantages and disadvantages of that arbitrary control.

Southern Masonry Meeting

THE SOUTHEASTERN REGIONAL MEETING of the National Concrete Masonry Association will be held at the Casablanca Hotel, Miami Beach, Fla., November 22-26, 1952. Three business sessions are planned, covering marketing, operations and general topics. The meeting will include a trip through Miami-area plants. Various social activities are also scheduled, including swimming, fishing, golfing and sight-seeing trips.

Nebraska Masonry Meeting

THE NEBRASKA CONCRETE MASONRY ASSOCIATION held its annual meeting in Lincoln, Neb., September 15, 1952, with an attendance of about 50 people.

Speakers at the meeting included R. E. Copeland, director of engineering, National Concrete Masonry Association, and Carl Menzel, consultant on concrete technical problems, Portland Cement Association.

Association activities during the past year included participation in the annual State Fair, with a permanent exhibit of concrete masonry farm buildings which brought beneficial results in sales promotion. An advertising program in state-wide publications, to promote the use of concrete masonry units in farm buildings, also was reported to have brought gratifying results.

Officers of the association are Warren Larson, Larson Cement Stone Co., Omaha, president; Lawrence Bergman, Omaha Concrete Stone Co., Omaha, vice-president; Lew Anderson, Western Brick & Supply Co., Lincoln, secretary; and Norman Moe, Omaha, treasurer.

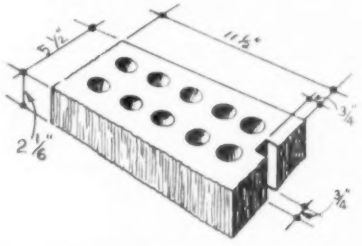
Wins Advertising Award

UNIVERSAL CONCRETE PIPE CO., Columbus, Ohio, has been awarded a "Joshua" award, a bronze wall plaque symbolizing first prize for the most distinguished use of match book advertising by a building equipment and materials producer during the past year, as recently announced by the Match Industry Information Bureau.

The awards, initiated this year as an annual program, were planned to help create standards for judging effectiveness of advertising design as a model for other advertisers. Winners were selected in 43 classifications of products and services. Universal's match book received top award in its classification, on the basis of ingenious use of the shape of a circular match cover to describe the products promoted. J. M. Millious, advertising director, received the plaque on behalf of the company.

Competitive Masonry Units

"SCR" brick, a new size masonry unit, has been announced by the Structural Clay Products Research Foundation. The brick is a modular unit designed to be laid with half-inch joints. The actual dimensions are 2⅛ x 5½ x 11½ in. Its weight is approximately 8 lb. The unit is



vertically cored by means of ten holes. The volume of coring is less than 25 percent of the total unit volume, hence it is classified as a solid masonry unit. A jamb slot is formed in each brick to facilitate the installation of metal windows or to provide a space for the blind stop extension of a wood window.

The new unit is designed to be laid in common (half) bond, its 6 in. thickness making it possible to turn corners and maintain the half bond without the necessity for a supplementary 10-in. corner unit. Modularly, it is laid up three courses to 8 in. of wall height. A total of 450 units are required per 100 sq. ft. of wall area.

Cover Picture

A RECENT ADDITION to the extensive facilities operated by Basalt Rock Co. at Napa, Calif., is this modern research laboratory. The structure was built entirely of materials manufactured by the company. Walls are 6-in. thick Stresterete panels. The well equipped laboratory is used for developing new processes as well as for production and quality control. An illustrated article on the laboratory is on page 134.

A NEW READY-MIXED CONCRETE PLANT has been opened in Vinita, Okla., by Bill Curnutte. Plant equipment includes two transit-mix trucks.

SABATELLO BROTHERS, Rotterdam, N.Y., is building a plant near the Erie canal in Rotterdam for the production of concrete septic tanks and other concrete products. The plant site, which lies along a B & M railroad spur, was recently changed from a residential-agricultural to an industrial zone.

SUPREME TRANSIT MIX, INC., recently began operations at its new plant at Auburn, Ind. Plant equipment includes a batching plant and two 3½-cu. yd. truck mixers. Owners of the company are Gerald Weiler, Max Shook and Mrs. Alma Shook.

CALIFORNIA HOMES & MATERIALS CO., Duarte, Calif., producer of concrete block, recently received a $60,000 loan for expansion costs and working capital from the Reconstruction Finance Corp. The loan was approved under authority of the Defense Production Act.

A LAND-USE permit authorizing operation of a ready-mixed concrete plant is being sought by Danville Warehouse & Lumber Co., Danville, Calif. Local residents, who had already brought two superior court actions in the past 18 months to halt operation of the ready-mixed concrete plant, are also protesting the land-use permit.

ROTH BROTHERS CONCRETE BLOCK CO. has established a new concrete block plant near Irwin, Penn.

THE CONCRETE PRODUCTS CO. plant at Columbus City, Iowa, owned by H. C. Smith, has been leased by Kenneth Kern.

TUOLUMNE COUNTY TRANSIT MIX, Sonora, Calif., has been granted permission by the California state corporation commissioner to sell 400 shares of its capital stock, at $100 per share. Directors of the firm are I. J. Symons, N. F. Jones, Fred R. Beerman and Fred Leighton, all of Sonora.

CLERMONT READY MIX CO., Withamsville, Ohio, has completed construction of a new ready-mixed concrete plant and has begun operations. The incorporators are June Hall, Robert R. Rering and Thomas F. Scanlon.

UNIVERSAL CONCRETE PIPE CO., Columbus, Ohio, has opened its 25th manufacturing plant at Jessups, Md. The plant will marufacture all sizes of concrete sewer, driveway and culvert pipe.

THE UNIVERSITY OF CALIFORNIA Extension's Division of Engineering, Los Angeles, Calif., has added three new courses, dealing with concrete construction, to its fall classes. Courses in architectural concrete, precast concrete and tilt-up construction and fundamentals of prestressed concrete will be given.

MEET HIGHWAY WEIGHT LIMITS WITH SMITH-MOBILES!

Have You Checked the Highway Weight Limits of Your State?

Sooner or later you'll have to face the problem of staying under the highway weight limits of your state. Naturally, you want to take that into consideration when you select your truckmixers. Smith-Mobiles have proper weight distribution that enables you to take full advantage of the allowable weight, either gross vehicle weight or weights on individual axles. These modern truck mixers permit you to carry the greatest possible payload . . . even to the fraction of a yard. And the beauty of it is, gross weight is reduced without in any way compromising with high-quality design, rugged construction and mixer performance. You get the same sturdy Smith-Mobiles . . . each one with an NRMCA rating plate. Write for new bulletin.

3 Ways to Get BIGGER PAYLOADS Legally . . .

1 SMITH-MOBILE with Rear Engine Drive.
Engine moved to rear of mixer, cutting almost 20" off the overall length. Enables you to move your mixer forward, shifting center of gravity and putting a bigger share of the load on the front axle. Gives you better weight distribution without using cab-over or cab-ahead type of trucks. Or, you can use a shorter wheel-base truck and get greater maneuverability. Both engine and transmission are completely accessible. Three Loadlimit sizes, 4½, 5½ and 6½ cubic yards. Higher ratings for agitators.

2 SMITH-MOBILE with Truck Engine Drive.
Mixer Engine eliminated. Weighs about 1300 pounds less than mixer equipped with separate engine. Enables you to mount mixer closer to cab, moving considerable weight from rear to front axle. Utilizes the same two speed transmission as rear engine drive model. One engine instead of two means less fuel consumption and less engine maintenance. Does a good job, even on curb and gutter work. Available for both Loadlimit and Closed-End Models in 4½, 5½ and 6½ yard sizes with higher ratings for agitators.

3 SMITH-MOBILE Trailer Mixer.
Enables you to carry from 8 to 9 yard payloads and still be within highway loadlimits. Most state highway laws allow you to carry about three yards more on a semi-trailer than on a tandem axle. Use of a suitable length trailer allows freedom in mounting mixer to attain proper load distribution. Makes unit easy to maneuver. Also you gain the advantage of having the tractor available for other jobs. Furnished in Loadlimit and Closed-End models in one size only, 6½ yard mixer, 8⅝ yard agitator.

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PROPERTIES OF CONCRETE FOR PRESTRESSING

Quality of aggregates and proportioning important factors in obtaining high compressive strength concrete required for optimum results

By HENRY J. GISH*

IN RECENT YEARS concrete quality has gradually tended toward an expression of its durability rather than its strength, and for certain exposed structures improved durability has been sought even at the expense of strength.

However, with the advent of prestressed concrete, high strength is again demanding our attention and we can expect more frequent opportunities to design concrete mixes for much higher than customary strengths. Prestressed structures demand quality concrete and it is obvious that its desirable qualities must be attained before the time of prestressing.

We do not claim possession of the answers to all the problems arising from the use of concrete in prestressed structures. However, in the light of present-day knowledge of concrete and its behavior, we have assembled a few of the high points which should serve as guides in producing concrete suitable for prestressing.

The strength of concrete is determined principally by:

(1) The quality and proportions of materials used.

(2) Curing temperature and moisture conditions.

(3) The use of accelerators.

(4) The effect of rate of frequency of load application.

The biggest factor in producing high strength concrete is the quality and proportions of the materials. The strength and particle shape of the aggregates have a marked effect on the strength of concrete. However, unless the aggregate is extremely weak, such as that used in certain lightweight concretes, the desired strength can usually be obtained by adjusting the cement content.

Cement is the most important ingredient in the mix, since it is the binder that holds the aggregates together. Furthermore, the ratio of water to cement used in mixing the concrete determines its ultimate strength and other properties. There are five major types of cement in common use.

Type I is the one normally used in concrete construction, and the other types are produced to meet certain special requirements.

Type II is for moderate heat evolution during hydration.

Type III is for high early strength.

Type IV is for low heat evolution.

Type V is for high resistance to sulfate attack.

Cements having high lime content develop high early strength. Also fine grinding tends to develop strength faster than coarse grinding. There also may be great strength differences between cements of the same type but from different mills. In general, the strength of Type III (high early strength) cement at one day equals the strength of Type I at three days, and the strength of Type III at seven days equals the strength of Type I at 28 days. While large differences in strength are obtained at early ages for concretes made with different types of cement, the strengths tend to approach the same value at later ages.

It is pretty generally known that the strength of concrete varies inversely with the water-cement ratio.

The author

The formula developed in 1918 by Duff Abrams in the laboratories of the Portland Cement Association is still applicable. With modifications which have been applied to adapt it to present-day cements it states that $S_{28} = \frac{22,500}{5.2x}$ where x is the water-cement ratio expressed in cubic feet per sack of cement.

However, we have found that this formula indicates strengths considerably higher than we are able to produce with cements and aggregates in the Kansas City area. The A.C.I. Standards of 1951 contain a compressive strength table which appears to fit our local conditions much more closely.

In our ready-mixed concrete operations we have made the following check tests at 28 days:

6-sack, nominal 4000 p.s.i. concrete, tested 4800; A.C.I. estimate 4400.

7-sack, nominal 5000 p.s.i. concrete, tested 5260; A.C.I. estimate 5200.

8.75-sack, nominal 6000 p.s.i. concrete, tested 6490; A.C.I. estimate 6600.

The estimated strengths were based on the same water-cement ratio as that used in the test batches. Cylinders were also made for 7-day tests, and 28-day strengths predicted by multiplying by the factor 1.33. In each case the predicted strength came close to the actual values obtained in the 28-day test, in fact much closer than could be obtained by applying some much more complicated formulas which have appeared in technical publications.

These mixtures were made in a transit mixer under regular commercial conditions. The sand ratios, based on absolute volumes, were as follows: for 6-sack mix—40 percent; for 7-sack mix—38 percent; and for 8.75-sack mix—35 percent.

These ratios will produce with limestone coarse aggregate a slightly oversanded condition. This we feel to be desirable both from the ease of placement standpoint and also for consistent strength qualities. It is true that lower sand ratios might yield slightly higher strengths through reduction of the water-cement ratio, but when the difficulties of placing harsh concrete and the strong possibility of getting honeycombed beams are considered, we feel that a slight degree of oversanding is to be preferred. The slumps were maintained as nearly as possible at 2 in. and the concrete was quite plastic and cohesive.

It is obvious that high strength is valueless if the concrete is not uniformly strong throughout its mass. Poor mix design may result in harshness and bleeding, which is the forcing upward of water by sedimentation of the heavier ingredients in fresh concrete. This results in the top layers of a beam having a higher water-cement ratio and hence a lower strength than the bottom of the beam, which is just the reverse of the most desirable condition. In other words, due to the bleeding the concrete is weakest where it should be strongest. This condition can be overcome by casting the beam upside down, but here again handling diffi-

(Continued on page 144)

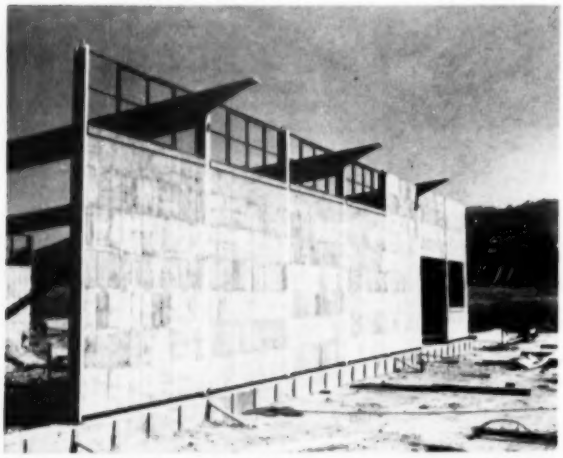
*Engineer, Stewart Sand & Material Co., Kansas City, Mo. Text of a talk presented before a conference on prestressed concrete held in May 1952 in Kansas City and sponsored by the extension department of the University of Kansas and the Portland Cement Association.

BASALT ROCK CO. LABORATORY FOR

California concern centralizes production control and product research for units and for applications in structure of Strestcrete panels

Placing Strestcrete roof panels on Basalt Rock Co.'s new laboratory. The building was built entirely of units manufactured by Basalt Rock

Wall panels had integral steel channels at each edge. Here the welded plate steel girder is being welded to columns in the wall panel



Strestcrete's integral steel frame building was used. Here wall panels and beams are aligned and tack welded ready for final welding

BASALT ROCK Co., Napa, Calif., which operates two three-Besser machine concrete products plants in northern California, is adding to its facilities by constructing a four-kiln plant for production of expanded sealed-surface lightweight aggregate and a casting plant for lightweight prestressed concrete products. To insure accurate control of quality of products manufactured by existing as well as new facilities, and to promote, investigate and develop other uses for lightweight concrete, a modern research laboratory has just been constructed and completely equipped.

Building Construction

This laboratory was built entirely of materials manufactured by the company. For the principal portion of the structure, a standard Strestcrete integral steel frame building was selected. Wall panels 8 ft. wide of 6 in. thick Strestcrete T & G siding with steel channels at each edge were delivered to the jobsite with steel windows and door frames already installed. Wall panels were erected and welded to steel base plates provided in the foundation, and the channels of the adjoining panels were welded together to form box-type columns. The channels of alternate panels were notched to receive fusion-welded plate steel girders also manufacturd by Basalt, thus providing beams on 16-ft. centers for support of the 6 in. thick Strestcrete roof panels.

Partitions within the building for office, temperature and humidity control rooms and the storage wing of the building were constructed of concrete masonry units. Pilasters and decorative veneer at entrance are of paving slabs. The completed structure measuring 80 x 32 ft. is modern in appearance with its two wide overhanging roofs and attractive entrance way.

Special Features

The interior houses a fog room and a dry room. The fog room, 9 x 11 ft., having controlled temperature of 70 deg. F. and relative humidity of 98 percent, is used for moist curing and to show the effect of moisture on concrete specimens being checked for volume change.

The dry room, also 9 x 11 ft., is maintained at 70 deg. F. and 50 percent relative humidity. It is used primarily for volume change readings and eliminates the large variables normally caused by temperature and humidity fluctuations.

The laboratory is equipped with a 300,000-lb. dual unit Baldwin compression machine. In addition to obtaining compressive strengths of specimens, it is also equipped with a Baldwin third-point loading apparatus which permits the determination of modulus of rupture values. For obtaining data on modulus of elasticity, a compressometer is used in conjunction with the Baldwin machine. Such data are of prime importance to engineers designing with lightweight concrete.

OPENS RESEARCH CONCRETE PRODUCTS

Volume change characteristics of various types of concrete are of great interest to the lightweight concrete industry. To obtain information on this subject a Whittemore strain gauge of 10 in. span as well as a length comparator for 1- x 1- x 10-in. bars is employed.

The absorption and moisture content of concrete units is determined by use of a temperature-controlled electric oven and an immersion tank with provision for suspended weighing. This equipment meets all requirements of A.S.T.M. specifications.

Facilities for producing trial batches of concrete consist of a Gilson screen for controlling the gradation of large quantities of aggregate, a Ro-Tap for final check on aggregate, an 8-cu. ft. paddle-type mixer, a Kelly ball for determining workability, slump cones and related minor equipment.

Other Equipment

To simulate the same conditions in the laboratory that are present in the new casting plant, a small Syntron vibrating table with controlled variable frequency is used to compress the mix in cylinders for comparable testing. When making tests of monolithic placements, cylinders are rodded in the prescribed A.S.T.M. manner conforming to the conventional placement by rodding in the field. Prior to testing, concrete cylinders are capped with a Nardiello capper to produce true right angle planes for loading.

In addition to lesser equipment such as an air meter, an autoclave operating at 300 p.s.i., specific gravity meter and others, the laboratory also includes a testing machine for large slabs and panels. This machine was designed and built by Basalt Rock Co. and is approximately 32 ft. long, 7 ft. wide and 10 ft. high. It is operated by means of hydraulic pressure and exerts a loading force through a cylinder 9½ in. in diameter. This machine is used to test channel slabs, reinforced beams, Strestcrete roof slabs and other panels up to 4 ft. wide.

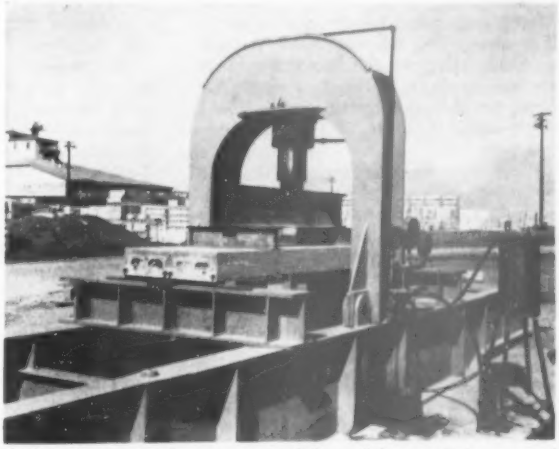
Function of Laboratory

Well equipped and staffed, the Basalt laboratory devotes all effort to the company's own production needs. Like most private laboratories, it is designed to correspond exactly with actual plant equipment. Numerous tests are first made on a small scale. By the time a particular project is ready for the field most problems have been solved. Such an approach results in faster, more accurate correction of plant economies and problems without disrupting production. New products requiring special types of mixes can be worked out well ahead of the start of the working schedule.

Hidden assets of the laboratory have already been forcefully demonstrated in two ways. First, it has created a sense of confidence in the quality of the company's products among architects, engineers and customers who have inspected the facilities. Second, it was of immediate value in training sales personnel so that they acquired a technical knowledge of concrete and became thoroughly acquainted with their products.

The laboratory is managed by Carl Rollins, who has devoted the last seven years to exclusive study and research in the concrete block field. He is a member of the American Concrete Institute and was formerly associated with the American Society for Testing Materials. He is assisted by S. V. McCall and J. T. Smith.

Interior of laboratory showing the dual unit compression machine, electric drying oven, cylinder capping and miscellaneous equipment



Machine for testing large concrete slabs and beams. It is operated by means of hydraulic pressure and can test slabs up to 4 ft. wide

Determining modulus of elasticity by use of compressometer in conjunction with 300,000-lb. capacity dual unit compression machine

2. A producer views the ready-mixed concrete business . . . .

FACTORS IN PLANNING YOUR PLANT

This is the second article in the series by Mr. Nicholson on his views of the ready-mixed concrete industry. The series began in the October issue with the article "Planning for Profits."

By JAMES A. NICHOLSON

YOU MAY BE A young man who has decided to become a ready-mixed concrete operator. There are a number of things that you should know about our industry. You should get good legal advice, especially on form of organization, tax matters and credit risks. Undoubtedly you will need the cooperation of a sound banking firm. You should have a fair understanding of the important part insurance plays in this business. You must be able to buy the cement and aggregates that you are planning to use.

You may already be a fair sized operator with a real expansion project in mind. It may be that you have a batching plant and are planning to build a central-mixing operation. You may be erecting an area plant to cut down length of hauls or setting up a temporary plant to service a big job.

Whether plunging new into the business or expanding present operations, there are a number of preliminary matters that should be considered before you make binding commitments for property or plant and delivery equipment. In either case, you will have to make arrangements for a plant location. You must decide whether to buy or lease property. You will have to plan a plant and select equipment. It will be necessary for you to determine your delivery operations and decide upon the type and number of hauling units.

There are a number of ways of getting into the ready-mixed concrete business. You can start completely from scratch. You can buy out a going operation. You can get involved through marriage. You can set up a big project and keep the operation going after the original contract is completed. You can add ready-mix to a building supply, concrete products, trucking or other established business.

You can start in the ready-mixed concrete business as a sole owner; you can form a partnership with one or more individuals, or you can incorporate. Generally without legal interference—even from the income tax authorities—you can change the form of organization. You should select the wisest course of action suiting your particular circumstances.

The time to consider the tax problem is when you organize the business, change operations or add plants. Your attorney and C.P.A. should help you to determine how you can operate for greatest tax advantage, what deductions can be taken, what expense records are required, how to handle inventory, whether leasing or buying is best in your particular case, if a fiscal year is to be preferred over a calendar year and other preliminary decisions.

The impact of taxes should be fully considered. You should so organize your business that you will get a maximum of earnings to keep with a minimum of income taxes to pay out. Today, you need real money to go into business. In 1936, I borrowed $3500 to make the plunge, had no business experience and knew nothing about concrete. In 1936 competition operated only ten trucks and no one knew too much about ready-mixed concrete. In 1936 ready-mixed concrete operators purchased less than 5 percent of the cement used in Ohio. Conditions have changed. Today to enter a competitive market you need both money and background. You should have business experience, engineering education or practical training in the construction field. Today in Toledo, ready-mixed concrete investments amount to several million dollars. There are 12 plants and approximately 100 delivery units. In 1951, approximately 50 percent of a much greater volume of cement shipped to Ohio users was utilized by ready-mixed concrete plants. Similar comparisons exist all over the United States. Ready-mix has become big business.

In the ready-mixed concrete industry you need money to purchase fixed assets such as property, facilities, plant equipment, trucks and transit mixers. You need enough working cash to pay bills promptly, take discounts, meet all monthly obligations for mixers and trucks purchased on time arrangements, handle inventory, extend adequate credit to dependable customers and cover other operating expenses. You must either have all the investment capital that is needed or be in a position to borrow readily additional capital that may be required.

Necessary capital can be investment money provided by you and others interested in the business, or money borrowed from banks and other sources. Determine what investment capital is available, then attempt to complete financing arrangements with the banker you have selected.

Before completing any purchase agreements for needed fixed assets, make sure that your banker's commitments on size and payment period of loan are signed, sealed and delivered. To buy trucks and mixers, seek at least a two-year maturity period. To set up new plant facilities, seek a five-year minimum repayment period. It is always dangerous business to depend on short term loans and future profits. Too many in our industry have wrecked themselves on "killing short term payments."

It may be necessary to get additional capital from other sources. A number of operators have done well with R.F.C. loans. Some young ready-mix producers, ex-service men, got their start with such loans arranged through the Veterans Administration.

Local community lending groups are sources of loans to small business. If you live in a city which has such a lending committee and needs a ready-mixed concrete operation, required additional capital might thus be provided. If you can't qualify for "bank" money, consider the possibility of adding a bonus in the form of profit sharing coupled with a secured loan to attract the needed capital. If only "high rate finance" money is available you had better not make the plunge.

Competent advice should accompany the contemplated purchase of each and every insurance policy. Risks involved in building new plants or expanding present operations should be carefully studied by trusted insurance counsellors. Changes in construction or operating methods often lead to substantial savings in premiums. Because they fail to get competent advice, many operators pay too much money for too little coverage.

All ready-mix operators need the following types of insurance:

1. Fire, lightning and windstorm.
2. Bodily injury and property damage liability.
3. Workman's compensation and employe liability.
4. Owner's or tenant's liability.
5. Contractory public liability.

Many new operators in consideration of limited capital will confine their insurance purchases to those policies. Some new operators will purchase other policies such as collision, burglary and theft, boiler and machinery, products liability, business earnings and comprehensive liability.

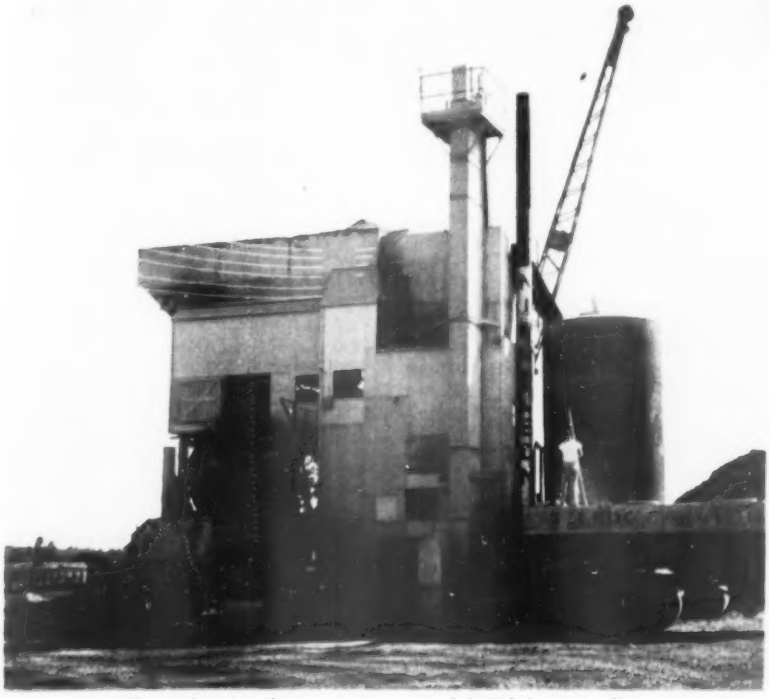
In most states employers are required to accept liability to their employes for job injuries and occupational diseases. Some states maintain workmen compensation commissions and, by law, insurance payments are made direct to the state.

A number of states require that operators of vehicles on the highway carry adequate insurance for bodily injury and property damage. Even if not required by law, such protection is a "must." A ready-mixed concrete man operating a fleet of trucks should go for higher limit protection ($100,000 and $300,000). Also full protection should be secured for plant accidents and damages.

In such policies, provision should be made to cover your operation of hired equipment, any business responsibilities assumed by contract lease, etc.; and liability for acts or omissions of sub-contractors and their employes. On hired trucks, get on safe ground by putting drivers of such equipment on your payroll. Don't depend on sub-contractors for coverage. Make certain that both you and such employes are fully protected.

On basic policies that all ready-mix producers should or must purchase, get full protection. The risks of a concrete man are great. Many accidents occur at our plants. Dangerous equipment is used, and employes sometimes fail to exercise proper precautions. The operation of a fleet of trucks on today's highways is a grave responsibility. The impact of a tragic accident is apt to result in serious consequences. Investments in a ready-mixed concrete operation are sizable and should be fully protected. As in the case of property and equipment, insurance should be carefully purchased.

Insurance arrangements should be based on trust. You should hide no material facts, make no false representations. The agent should point out all exclusions. The policy should contain no hidden clauses. Your signature on the line should immediately bind the insurance company. The total policies should add up to full, economical, sound coverage.



A small central-mixing plant serving a corner of the Toledo metropolitan area

Before finally deciding to become a ready-mixed concrete operator or expand present operations, make certain that the cards aren't stacked against you. Be sure that you can purchase specification material in required amounts and at a cost comparable to that of your competitor. You must be able to buy acceptable aggregates in your own market. Distant shipments would put you at a great cost disadvantage. Needed cement must be available. Too many new companies have been hurt beyond repair because they have entered this business either without getting proper commitments from cement companies, or because cement companies on whom they have depended have been unable to ship as promised. Above all, make certain of your cement supply before laying your money on the line to purchase plant and delivery equipment.

Site Selection

The best possible site for a ready-mixed concrete operation is one set up at the only aggregate plant in town, which you control and which is located in the center of a large metropolitan area. Under these conditions you've got the only low priced aggregates in the market and short hauls for your delivery equipment. Under such fortunate conditions, it is rather difficult to fail. Undoubtedly you will experience difficulty locating such a site in the city or part of a city in which you wish to locate. It is up to you to select the next best possible location.

The selection of an operations site and the plant layout are important factors in determining the profit possibilities of the new venture.

In metropolitan areas the choice of a site for a ready-mix plant lies in the comparative value of accessability to aggregates as compared with a location that permits shorter, faster moving hauls. The desirability of a waterfront site to get cheaper barge deliveries of aggregates may be offset by the advantages of shorter hauls, possibly from a more convenient location.

In planning to go into the ready-mixed concrete business you must decide whether to serve a section of the city or the whole urban community. It is generally best to locate in a growing city, in a new section of a city or in a part of a city separated by natural hazards or barriers from existing concrete plants. The city of Fort Wayne, Ind., is cut almost in half by a main line railroad. Toledo, Ohio, is cut in two by the Maumee river. To serve the whole urban area, several plant locations may be required. In transit-mixing equipment, long hauls are expensive. The number of plants and spacing thereof should be arranged to achieve the lowest over-all operating expense.

To decide wisely upon the location of a plant site, the probabilities of your delivery operations must be studied. At the least, you should have a rough idea where the bulk of your deliveries are going. You will then be able to determine which factor is more important—accessability to the aggregates, or short, fast moving hauls.

Aggregate shipments are made by barge, rail and truck. In all three cases and on a mileage basis, the cost of aggregate delivery will always be much less than the cost of delivering concrete. On comparative tonnage figures, concrete deliveries cost at least twice as much as hauling aggregates on the same length haul.

The general area in which you wish to locate is your first consideration. Available sites within that area should then be investigated. The area selected should be in a growing sec-

tion with plenty of properties available for industrial expansion and residential development. Now is the time to face the question, "Is there a market"? You should feel absolutely certain that there is room in the area for a profitable operation. The fact that a ready-mix producer is already operating in the area you plan to service is no reason that a new, well-run concrete plant cannot succeed. The presence of such a competitor, his advantage of being there first with an established clientele, and all other factors should be carefully weighed. If the area clearly cannot support two operations, some one is going to get hurt.

Choosing a particular site in the selected area is your next consideration. Whenever possible choose a location which now has rail facilities or where adequate space is available and tracks can be installed. Even if both aggregates and cement can be shipped by truck, a rail siding has emergency value. A strike may stop truck deliveries; rail delivery of "out of area" cement then may be required. Eliminate the sites in the area which have zoning restrictions or are in neighborhoods where even a well-run concrete plant would not be welcomed. Keep out of a neighborhood where you are not wanted.

Check individual plant sites carefully. Is the property suitable for possible plant expansion? The time to think about expansion is before you buy or lease. Does size and shape of property fit the projected plant layout? You may have to substitute a vertical elevator for the conveyor you were planning to use. Are water and power facilities plentiful? Is heavy trucking permitted on approach streets to the plant site? How about the drainage problem? Are storm sewers accessible? Can the property handle wash water and returned concrete? Adequate drainage is a basic requirement of property being considered for a new operation.

Be extra careful about erecting a plant in a built-up neighborhood. Heavy trucking may cause complaints. The handling of cement and aggregates may develop a dust problem. Certainly if you develop a neighborhood location and dust becomes a serious problem, either you will provide for dust elimination or your use of the property to process concrete will be enjoined.

In addition to deciding upon a particular site, a decision must be made on whether to lease or buy. You can only buy if your financial position permits the investment. There may be some tax advantages in leasing. Other advantages of leasing property include lower initial investment, more cash available for operating expenses and equipment purchase, lower bank loan requirements and freedom from a number of ownership risks.

No consideration should be given to erecting a permanent ready-mixed concrete plant on leased land unless a lease for a minimum of ten years (with an agreed renewal) can be obtained and the rental rate is in line. If the proposed monthly rental is too rich for your blood, suggest the possibility of a fluctuating figure based on yardage, gross income or profits of the business.

Make certain that a lease arrangement which seems to be the right answer doesn't develop into an impossible situation. Avoid lease deals with either suppliers or customers. One producer built a plant on property of an aggregate supplier who couldn't furnish specification material. Another operator erected a central-mixing plant on property belonging to the city's principal contractor. Arrangements called for a preferred selling price. Other contractors, suspicious from the start, have continued to resent this transaction.

Before you sign on the dotted line, be absolutely certain there is not any "catch" to the property you are planning to lease or buy. Make sure that you have carefully considered zoning restrictions, availability of power and water, expansion possibilities, drainage, accessability of approach streets, provisions for railroad siding, flood danger and other pertinent factors.

One particular kind of a site deserves special consideration. In building a plant on hillside property, the construction of a bridge or ramp permits direct dumping of materials from trucks into the overhead storage bins. Some operators select a hillside location solely to eliminate the initial investment in elevating equipment. If such a location requires that the loaded hauling unit must always climb a steep grade to get out of the plant property, a hillside operation generally will not prove as economical as a layout on level land. If the city or area which you are serving is built on different levels, and you can reach a good percentage of the approach streets without climbing a hill, that hillside location has a good deal of merit.

The size and shape of the selected property should be adequate both for the planned set-up and for possible future expansion. It is preferred to tailor the property to the plant, not the plant to the property. If the location under consideration will not lend itself to the contemplated plant layout, it is best to choose another site. There should be adequate room for the concrete plant, required storage piles, handling equipment, roads, railroad tracks, warehouse, boiler room, washout facilities, maintenance shop and dispatch office.

The size of the storage piles is dependent on the distance from suppliers, dependability of deliveries, adequacy of overhead bins and volume of business. The number of stockpiles is based on specification requirements for different sizes of aggregates. The arrangement of stockpiles is determined principally by requirements and limitations of the handling equipment.

If the plan is to use a belt conveyor to elevate aggregates, the property should not be less than 300 ft. long by 200 ft. wide. The conveyor should be erected lengthwise on the property. If adequate space is not available, rather than attempt any adjustments go to elevator or crane handling.

The concrete plant should be so constructed that there can be no question as to the adequacy of the footers, foundation walls, frame work, supporting columns and the bin structure. The plant should be located at the front of the property or close to the exits to key approach streets. Wide roads should be conveniently located to allow channeled handling of trucks (both incoming and outgoing).

The extent of track facilities should be determined by accessability to sources of supply, amount of storage space and the anticipated yardage of the plant. There should be minimum provision for the number of cars required to be handled on a busy day. Some operators provide adequate track space for loaded cars, then fail to provide equally for empties. In a large operation it is best to have two lines of tracks with provision for discharge into a common unloading facility. A double track arrangement makes for a compact, efficient layout. In combination rail and truck plants, similar common use provisions should be made.

Many plant planners overlook the necessity of setting up proper facilities to handle maintenance work. We made such a mistake at our main plant. Space is so seriously limited that our maintenance costs are unnecessarily high. On each new job we spend considerable time moving things around just getting ready to start the work. Yesterday's failure to plan has caught up with us.

If your plant layout provides for a separate dispatching office, have incoming trucks pass the office on one side and outgoing trucks pass on the other. Provide room on both roads for truck parking.

Trucks and transit mixers must be carefully and speedily cleaned at the end of each operating day. An answer must be found for the twin problems of returned concrete and wash water. An efficient washout rack is a basic requirement. Property drainage should permit the construction of an acceptable settling basin. Unless you provide required tools, you cannot blame drivers for shoddy appearance of hauling units or unnecessary overtime.

Dust collecting equipment should be planned for all ready-mix operations. Cement dust is always a problem around the weigh hopper. At a central-mixing operation, provision should be made for a hood and a blower at the end opposite from where ma-

(Continued on page 151)

AGGREGATE SUPPLY AND MACHINERY DEVELOPMENTS EMPHASIZED AT CINDER BLOCK MEETING

THE SUMMER MEETING of the Cinder Concrete Manufacturers was held at Chalfonte-Haddon Hall, Atlantic City, N.J., August 11-13, 1952. The meeting was similar to those held in previous years under the auspices of the National Cinder Concrete Products Association which is affiliated with the National Concrete Masonry Association, with the sessions being rather informal discussions without any prepared lectures.

The sessions were arranged so that the afternoons could be devoted to ocean bathing and other boardwalk attractions of Atlantic City. The first day was devoted to lightweight aggregates—sources, supplies and operating problems. The second day included discussions on pumice and general problems that were of concern to the entire concrete masonry industry. On the third day the manufacturers' representatives had an opportunity to bring the membership up to date on manufacturing and transportation techniques.

Cinder Supply

The first day's session was under the chairmanship of Harry H. Longenecker, Building Units, Inc., Primos, Penn., secretary of the National Cinder Concrete Products Association. Much of the discussion revolved about the present and future supply of quality cinders that are available. It developed that through the East there are large reserves of cinders but they must be processed to make them of a suitable grade to make quality block. Processing consisted essentially of dry screening with a rejection of the minus ¼-in. material. By such rejections the carbon content of the plus fraction could be kept low enough to meet the manufacturer's needs.

Some anthracite cinder beds were being reprocessed by one of the power and light companies and the minus fraction had a high enough carbon content that the material could be reburned to advantage by the utility company. Bank-run material, it was pointed out, is hard to screen during winter months or wet weather. With the fines out, these cinders weigh from 1150 to 1200 lb. per cu. yd.

The round table discussion brought out that the supply of cinders in the Cleveland, Ohio, area was nominal and the supply in Indianapolis, Ind., varies but is becoming more of a problem each year. One operator mixes a lightweight slag with his cinders to make a better looking block as well as to conserve cinders. Pittsburgh, Penn., is low on cinders and some slag is used as replacements. In the Washington, D.C., area it was pointed out that there were no cinders but an adequate supply was coming from the anthracite beds in Pennsylvania.

It also developed that twice as many cinder block are now being produced as there was ten years ago, and with the increased use of pulverized coal and natural gas, the supply problem has become more acute. One member said that in Detroit one of the larger utilities was experimenting with sintering of fly ash so as to augment the supply of lightweight block material. M. J. Shimko, Anthracite Cinders, Hazelton, Penn., told of his new operation; he was shipping 10 to 12 cars per day from it. One operator told of his successful use of Lelite (see September, 1951, issue of ROCK PRODUCTS, page 94, on Lehigh Materials Co.'s operation for description of aggregate) and of the use of an air-entraining agent when using that artificial lightweight aggregate.

M. F. Ledford, Stearns Manufacturing Co., Inc., told of the successful operation of a relatively new artificial lightweight aggregate plant in Denver, Colo., by Cinder Concrete Products, Inc., and the use of sintering equipment developed by Stearns. Two sintering hearths are in operation producing a semi-harsh but tough sinter that weighs from 42 to 50 lb. per cu. ft., depending on fineness gradation. Standard 8-in. block from this sinter weigh from 22 to 24 lb. The hearths used are circular and rotate in a horizontal plane. Each hearth is made up of 24 segments (pie-shaped) 6 in. deep. Coal is mixed with clay charge and as the hearth rotates the charge is ignited by an inverted furnace. Production is 600 cu. yd. per 24 hr. from the two hearths. Semi-anthracite coal is used in the Denver operation. Crushing via a single roll crusher and screening over a three-deck screen is a part of the operation. The cost of the plant was said to be about equal that of a modern 4,000,000 block per year operation.

Haakon Paulson, Besser Manufacturing Co., told of lightweight aggregate plants using the Besser technique that were in operation at Marietta, Ohio, and Detroit, Mich. He said the plant in Detroit could test clay for others, and that the sintered material was selling in the $4 per cu. yd. range. Walter Horn recounted his unfavorable experiences with the unloading of wet and frozen lightweight aggregates during winter months.

E. W. Dienhart, executive secretary, National Concrete Masonry Association, Chicago, Ill., spoke briefly on the possibility of making good cinders out of bad by adequate processing. He reviewed tests for "pops" and discolorations and the N.C.M.A. and Portland Cement Association literature available, and the work done by both organizations directed toward making a better concrete masonry unit from cinders. Herbert F. Geist, Cleveland, Ohio, told of the addition of acetylene by-product calcium carbonate (wet) to lime cinders in storage piles. He adds the lime to crushed cinders. In the storage pile, the limed cinders tend to harden or set somewhat which is an operating inconvenience but not too serious. He said he had solved the problem of pops and discoloration using N.C.M.A. and P.C.A. recommendations.

The second day opened with a brief talk by R. H. McClure, Matrad Corp., New York, N.Y., who told of his company importing pumice to the Atlantic Coast from two islands near Greece in the Mediterranean Sea. He said that a ship would carry about 20,000 cu. yd. and that the material weighed from 24 to 35 lb. per cu. ft., depending on size specifications and from which island it was shipped. He described the insulation and other physical properties of pumice and said that the material ran from 66 to 72 percent silica; 12 to 15 percent Al_2O_3; ½ to 3 percent iron oxide and up to ½ percent MgO. The CaO content, he said, was from 1 to 4 percent, a trace of sulfur, and K_2O and Na_2O ranged from 2 to 4 percent for each of the alkali oxides. The material was shipped from minus ⅜ in. to pan and cost $4.95 per cu. yd. f.o.b., Atlantic seaboard. Standard 8-in. units made from this pumice weighed approximately 18 to 23 lb.

F. W. Bentley, Salisbury, Md., told of his experience using pumice from Greek sources. He said the material was easy to work, caused little wear on the molds and that the masons in his area like the block. He said he got a yield of 25 block per sack of cement.

Shortage of Masons

Ralph Condo, Somerville, N.J., told of the need to instruct boys in high schools in the rudiments of the industrial arts and that masonry should be stressed because of the alarming shortage of young masons. He said that in one union where there were 64 masons, only three were under 30 years of age with most of the remainder being oldsters. Unless some positive action is taken, Mr. Condo

(Continued on page 152)

NEW MACHINERY

Crawler Fork-Lift Tractor

AMERICAN TRACTOR CORP., Churubusco, Ind., has announced a crawler fork-lift tractor, the Terra-Lift, be-

Crawler fork-lift tractor

ing added to its line of medium-sized gasoline and diesel Terratrac crawler tractors. Model M2 has a 2000 lb. capacity with an 8 ft. 7 in. lift, while model M4 has a 4000 lb. capacity with a 6 ft. lift. Optional rubber track shoes facilitate operations inside a warehouse or plant.

Crane Arm

TOWMOTOR CORP., 1226 E. 152nd St., Cleveland 10, Ohio, has developed an accessory crane arm for its lift trucks. It is formed of steel pipe and a drop-forged standard hoist hook with a swivel suspension. Special size or shaped hooks can be furnished. The crane arm is available with adjustable reach features (with adjustments in increments of 6 to 12 in.). This accessory is exchangeable with the manufacturer's forks.

Concrete Additive

VERISET CORP., 150 Nassau St., New York 38, N.Y., has developed an air-entraining agent for concrete called "Veriset." It is a readily soluble liquid, which is added either to the aggregate in the batching hopper or in the mixing water. It entrains air above 6 percent, and also gives an increase in the compressive strength. The manufacturer claims that it utilizes all the available cement with a minimum amount of water, and provides sufficient entrained air to increase the workability, reduce the bleeding and increase the durability. There is a water reduction of 15 to 25 percent.

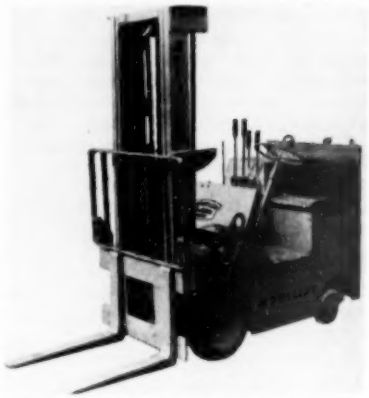
After 200 cycles of freezing and thawing, concrete made with Veriset showed a decrease in sonic modulus of 44 percent, according to tests made at the Allentown Testing Laboratory. It withstood freezing and thawing 600 percent over the non-Veriset concrete. These advantages are claimed to reduce the cement factor or to allow the use of more aggregate without loss in compressive strength.

Anti-Seepage Compound

COPROX, INC., Dept. H, 1270 Sixth Ave., New York 20, N.Y., has announced a new compound called "Coprox," containing copper oxide and portland cement which is said to help seal out water from porous masonry walls inside or out, above or below ground. The compound, the manufacturer states, contains no fats which are broken down by the lime in cement, or iron which ultimately rusts out. It is mixed with water and applied with a stiff fiber brush. It hardens on all clean, porous concrete, cinder block, cement stucco, unglazed brick and porous natural stone. There are five decorator's shades. It can be used on foundation walls, basements, storage tanks, garages, swimming pools and fish ponds.

Fork Lift Truck

MOBILIFT CORP., 409 S.W. 13th Ave., Portland 5, Ore., has announced a 3000-lb. HR sit-down type fork lift truck with independent rear wheel suspension. The suspension is designed to cut down driver fatigue and give the load and vehicle less shock. It consists of a heavy-duty spring



Fork lift truck with rear wheel suspension

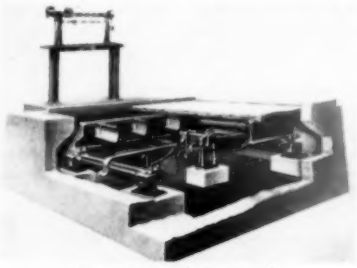
and an airplane type shock absorber for each rear wheel. The lift mechanism retains the manufacturer's roller chain lift with hydraulic tilt cylinders. The equipment is powered by a heavy-duty, air-cooled 3-cyl. engine and has a two-speed transmission. Standard mast heights for the HR model are 63 in., 72 in., and 83 in. Special mast heights are available.

Mobile Radio-Telephone

GENERAL ELECTRIC CO., Communications Section, Commercial and Government Equipment Dept., Electronics Park, Syracuse, N.Y., has announced a mobile radio-telephone for use on fork lift trucks and other industrial type vehicles. The radio-telephone, available in either 1.5 or 10 watt ratings, features all operating controls mounted directly on the front of the radio cabinet. On industrial type vehicles, the radio-telephone is usually installed right next to the operator. The loud-speaker is separate, allowing convenient mounting atop the radio cabinet or on the steering column of the vehicle. The antenna is mounted on the top of the cabinet.

Axle Load Scales

THE HOWE SCALE CO., 2947 Scale Ave., Rutland, Vt., has announced a complete line of heavy-duty axle load scales. The line includes nine standard models with a capacity range of



Heavy-duty axle load scale

15, 20 and 30 tons. Platform sizes are 4, 6 or 8 ft. long by 10 ft. wide. The scale is constructed with the three-lever pipe lever system and incorporates the ball-bearing principle of construction.

Interior Wall Coating

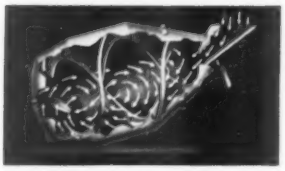
BAKELITE CO., Div. of Union Carbide & Carbon Corp., 260 Madison Ave., New York 16, N.Y., has developed a protective, decorative coating for interior walls of public-type buildings based on Vinylite resins and applied by spraying. This coating is claimed to resist moisture, mould and mildew, oil, fats, etc. Sprayed directly on walls of cinder block or concrete block, the coating is said to completely seal the surface.

Pallet Truck

YALE & TOWNE MANUFACTURING CO., Philadelphia Div., Philadelphia 15, Penn., has added a 4000-lb. capacity high lift pallet truck to its Worksaver line of motorized hand trucks. It is designed to transport and stack skid bins or single-faced pallets.

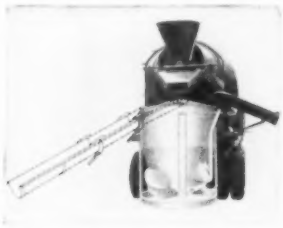
The truck will stack at heights up to 120 in. It has side caster wheels for stability and constant floor contact under all operating conditions.

Only Jaeger offers these advantages, *plus* light weight for biggest payloads



Longest life drum, fastest to charge, mix and discharge

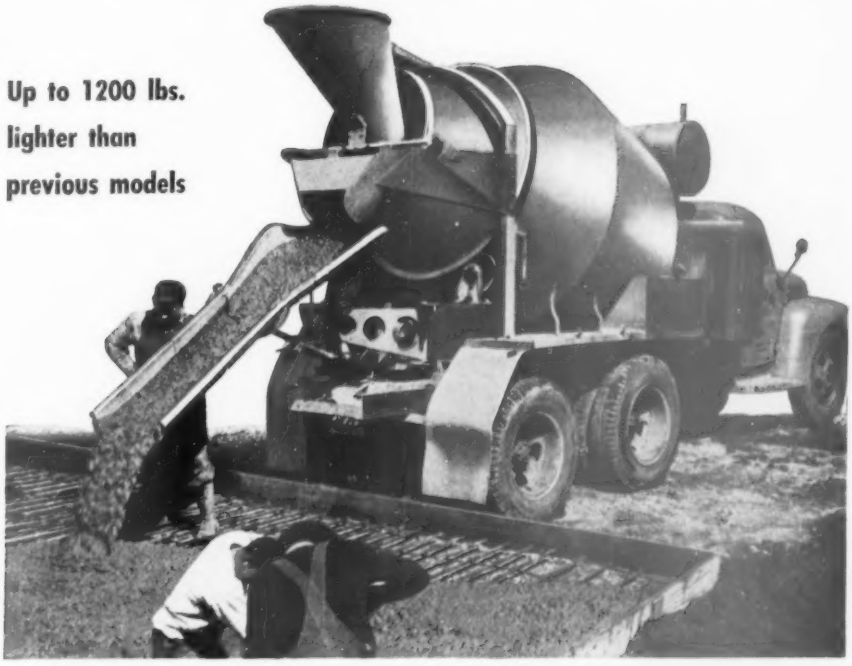
No change in proven superior design and heavy duty construction of the Jaeger "dual mix" drum. All supporting members designed for maximum material loads.

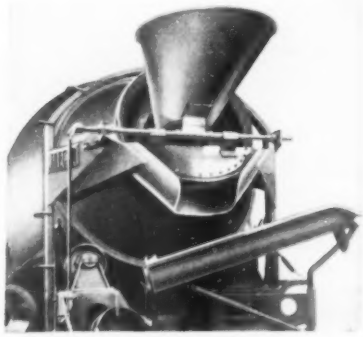


"To-the-Spot" 3 piece chute

Instantly swings aside for extra big buckets or provides 5' to 13' chute combinations for any condition.

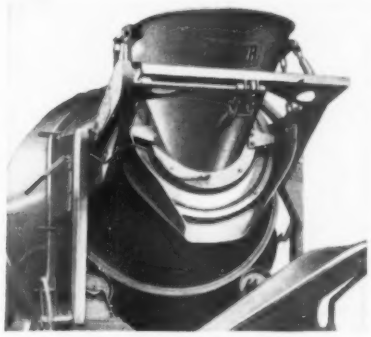
Up to 1200 lbs. lighter than previous models





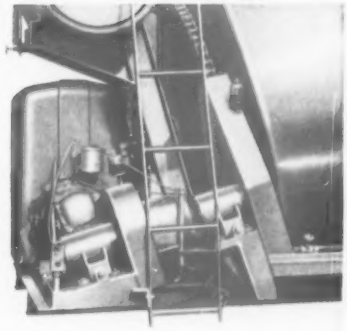
Open-type end loader with instant-opening drum gate

Prevents cement blow-back or water spillage when charging and loss of concrete even on steepest grades.



Sealed end-loader with perfected grout-proof seal

One quick wheel-turn fully opens hopper. One push of lever lubricates and completely flushes the seal.



"Comatic" transmission gives hydraulic finger-tip control of drum

Power does the work. Automatic brake prevents shock load to transmission gears when reversing drum rotation.

You can mount Jaeger "MIX PLUS" models on any standard make of truck, haul the largest legal payload, charge, mix and discharge faster than with any other truck mixer, and continue to enjoy these advantages throughout a life expectancy of 8 to 10 years compared with the 4 to 5 years average life of cheaply built mixers that cost as much or more to buy. That's why more concrete continues to be mixed and hauled in Jaeger truck mixers than by any other method.

For full information see your Jaeger distributor

THE JAEGER MACHINE COMPANY

603 Dublin Avenue, Columbus 16, Ohio

World's largest builders of TRUCK MIXERS, AGITATORS • PUMPS • COMPRESSORS • CONCRETE MIXERS • PAVING MACHINERY

increases hourly yardage output over 10% with Koehring *fast-shuttling* DUMPTORS

THERE is no need to turn at the loading unit, along narrow haul roads, or on the fill with fast-shuttling 6-yard Dumptors. Koehring constant-mesh transmission gives the same 3 fast speeds forward and reverse, lets Dumptors operate with equal ease in both directions. Every turn saved cuts 15 seconds off your cycle time, and adds up to an important increase in yards hauled per hour. Here's a typical example:

On a 1,000-foot haul, eliminating only 2 turns saves ½ minute every round trip. Where you would get an average of 13.6 trips per hour with 2-turn operation, Dumptor *no-turn shuttle hauling* gives you 15.4 trips — an increase of 1.8 trips an hour on the same 1,000-foot haul.

Fast, easy spotting and 1-second gravity dump help keep production high. Costs stay low because there are no complicated, mechanical body hoists to slow up haul cycles — no expensive hoist maintenance or down time to eat into your profits. Let your Koehring distributor show you Dumptor's many other cost-cutting advantages.

KOEHRING COMPANY, Milwaukee 16, Wis.
Subsidiaries: JOHNSON • PARSONS • KWIK-MIX

KOEHRING DUMPTOR®

KOEHRING HEAVY DUTY

EK233

This mountain-side job shows typical no-turn shuttle advantage. Hauling along narrow ledge, Dumpter spots close to Koehring 1½-yd. 605, gets its load, drives to fill, dumps, returns to shovel — without turning.

all welded . . . PORTABLE

FOR TRANSIT-MIX • CENTRAL-MIX • CONCRETE PRODUCTS

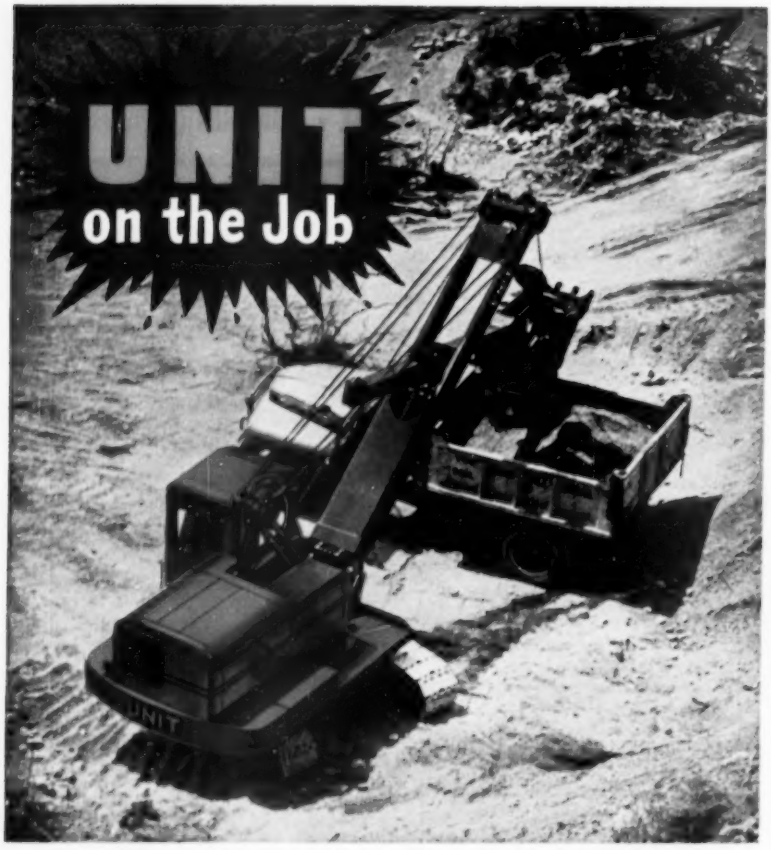
Quickly moved to reduce haul distance of mixed concrete, Johnson Transit-Mix Plant has all-welded, easily-assembled units. Its portable-section Tandem Bin minimizes field bolting . . . dismantling, erecting take less than half the time required for moving a bolted plant. All sections are easy-handling width . . . 11' or under. 7 bin sizes from 55 to 210 cu. yds. can be arranged for 2, 3 or 4 aggregates. Central cement compartment holds 61 to 183 bbls. Check its flexibility for transit-mix, central-mix or concrete products operation. See your Johnson distributor, or write us for complete facts.

JOHNSON CLAMSHELLS HANDLE EXTRA TONNAGE *because:*

- **Large diameter sheaves, with fully sealed needle bearings, reduce friction power loss, deliver full power to cutting lips.**
- **All-welded construction improves bucket balance, lowers center of gravity, lets teeth dig in straight and deep for capacity load in any material.**
- **Hard manganese cutting edge, welded to lips, gets tougher with use, assures long life.**
- **10 sizes . . . ⅜ to 3 yards . . . General Purpose, Wide Rehandling and Heavy-Duty Digging types. Write for new catalog.**

X13

(Koehring Subsidiary) **C. S. JOHNSON CO.** CHAMPAIGN, ILLINOIS



SWING SPEED makes PAY LOADS!

Here's a UNIT ½ Yard Shovel doing a PRODUCTION DIGGING JOB in a gravel pit. UNIT owners like the ease of operation and the FULL VISION CAB for complete visibility. They also like the sturdy construction and the many mechanical features, plus the ECONOMICAL PERFORMANCE and LOW UP-KEEP which all add up to EARNING POWER. Why not investigate what UNIT can do for you — on YOUR next excavating and material handling job?

SEE FOR YOURSELF: *Let us send you our novel TV Brochure. It illustrates the complete UNIT line.*

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6431 WEST BURNHAM STREET • MILWAUKEE 14, WISCONSIN, U. S. A.

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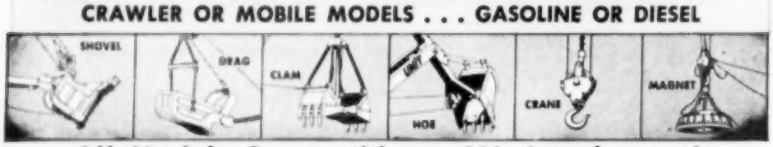
½ or ¾ YARD EXCAVATORS...CRANES UP TO 20 TONS CAPACITY
CRAWLER OR MOBILE MODELS . . . GASOLINE OR DIESEL



All Models Convertible to ALL Attachments!

Concrete for Prestressing

(Continued from page 133)

culties present themselves, since in this position the beam must be picked up at its center point, and when in the upright position the support must be transferred to the ends of the beam.

The maximum aggregate size plays an important part in the production of high strength concrete, since the larger the aggregate particle the less its surface area per unit of volume, and hence less water is required to wet it. For highest strength we should then always try to utilize the maximum size aggregate that can be accommodated by our forms and reinforcing steel.

Methods of increasing the rate of strength gain include: steam curing, vacuum and pressure extraction of excess water, and the use of accelerating admixtures. The optimum temperature for steam curing has been found to be from 130 to 165 deg. F. Higher temperatures tend to cause severe cracking and swelling. Also, a delay of from 2 to 6 hr. prior to steam curing seems desirable. While the 24-hr. strengths realized from steam curing may be three or more times the strength with moist curing at 70 deg. F., the strengths at 28 days will be approaching the same value, and at one year they will be approximately equal. In each case trial runs are essential to determine the best procedure to use, as many variables enter into the final result.

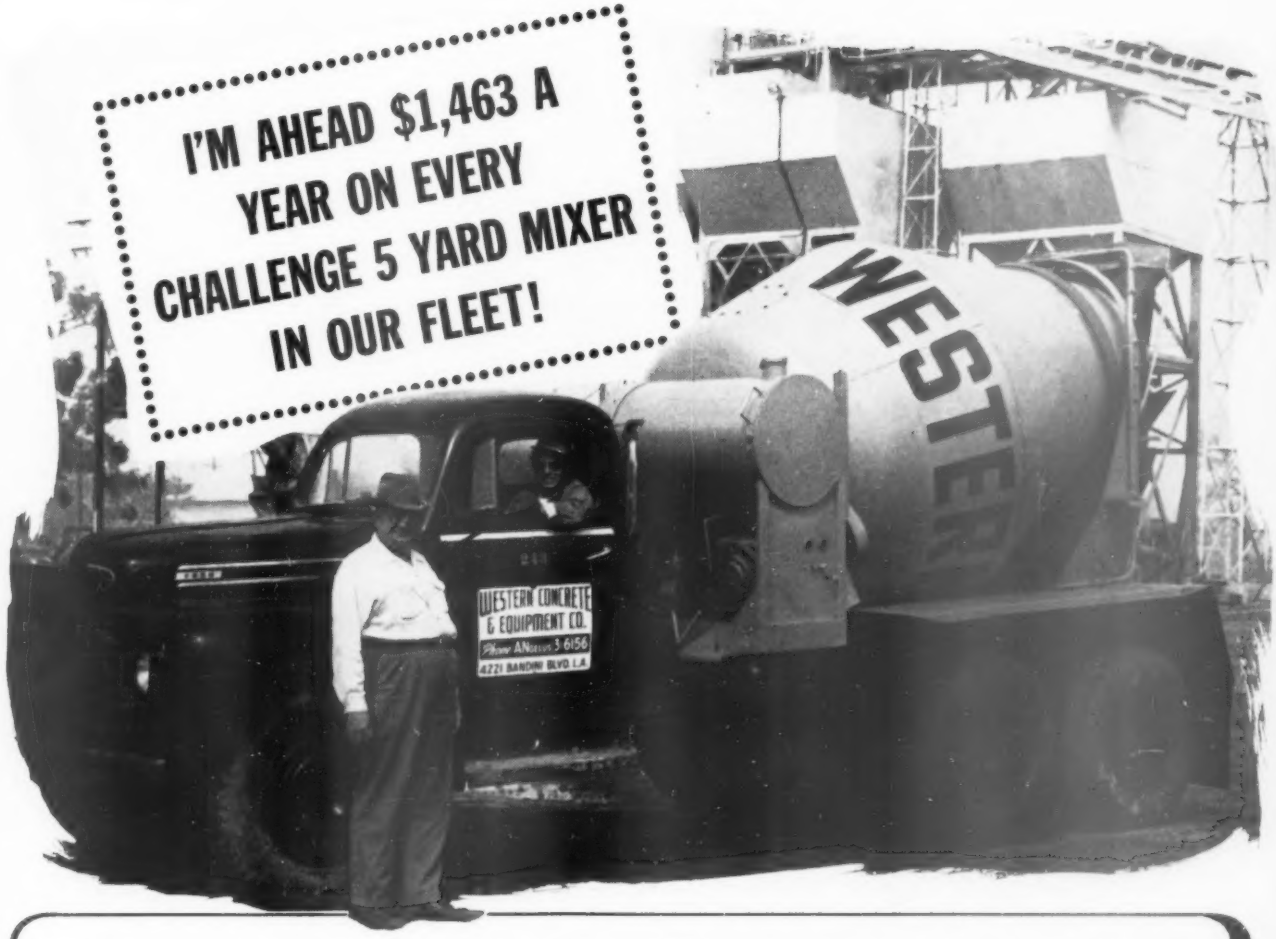
Vacuum extraction and pressure extraction of excess water both serve to reduce the water-cement ratio and in that way improve both the rate of strength gain and the ultimate strength.

The most commonly used accelerator is calcium chloride. It is used frequently in cold weather to permit the earlier removal of forms and to acquire strength sufficient to make the concrete resistant to freezing temperatures at an early age. Calcium chloride contributes most to the strength at early ages, but it is a fact that the addition of this admixture improves the strength at all ages when used at the rate of about 2 percent of the weight of cement. It should be remembered that as the temperature of placement increases the percentage of calcium chloride should be reduced for optimum results.

Concrete for prestressing should have high compaction and low voids. Air bubbles obviously have no strength and therefore their presence in prestressed concrete is not desired. While some may contend that since entrained air improves workability and durability when exposed to freezing and thawing action it therefore should be incorporated in the concrete for prestressing, it is also well known that entrained air in mixes having a high cement factor produces a substantial loss in compressive strength,

(Continued on page 148)

I'M AHEAD $1,463 A YEAR ON EVERY CHALLENGE 5 YARD MIXER IN OUR FLEET!



So says Roy Walton, left, President, Western Concrete & Equipment Co., Los Angeles, Calif.

"That's the actual figure that showed up on the profit side of our ledger when we decided to make an item for item cost analysis of our truck mixer fleet . . . comparing our Challenge 5 Yard Mixers with other make 4½ yard mixers.

"We took everything into account, believe me! We worked out the initial equipment costs, maintenance and repair costs, and every other item of expense. We worked out in detail the actual cost to deliver a cubic yard of ready mixed concrete to the job site.

"compared to a typical 4½ yard mixer,

- *our Challenge 5 yard mixers save 19c on every cubic yard of concrete delivered . . . 95c per load.**
- *figuring 7 loads per mixer per day, we save $6.65 per unit.*
- *in 220 working days per year, the extra profit for each Challenge 5 yard mixer in our fleet is $1,463."*

*Figures are based on rated mixer capacity. A comparison on overload remains the same for both mixers because drum volume is in accordance with TMME standards.

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1815 No. Broadway, CApitol 2-9111
Los Angeles 31, California

Exclusive National Distributors for CHALLENGE, The Modern, Streamlined Truck Mixer

Get the complete Challenge "profit" story. Write, wire or phone for the Challenge folder giving detailed cost analysis.

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Please send latest folder giving information on Challenge costs.

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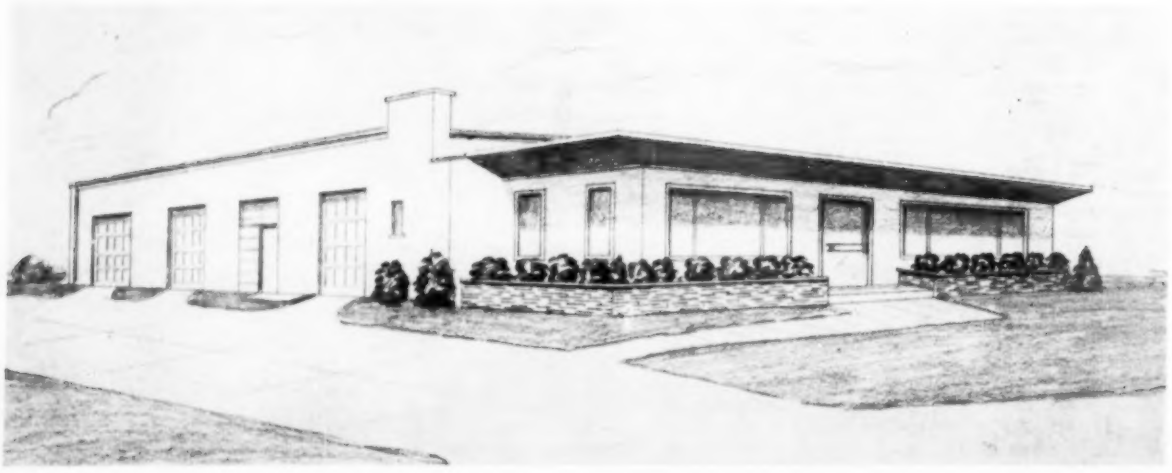

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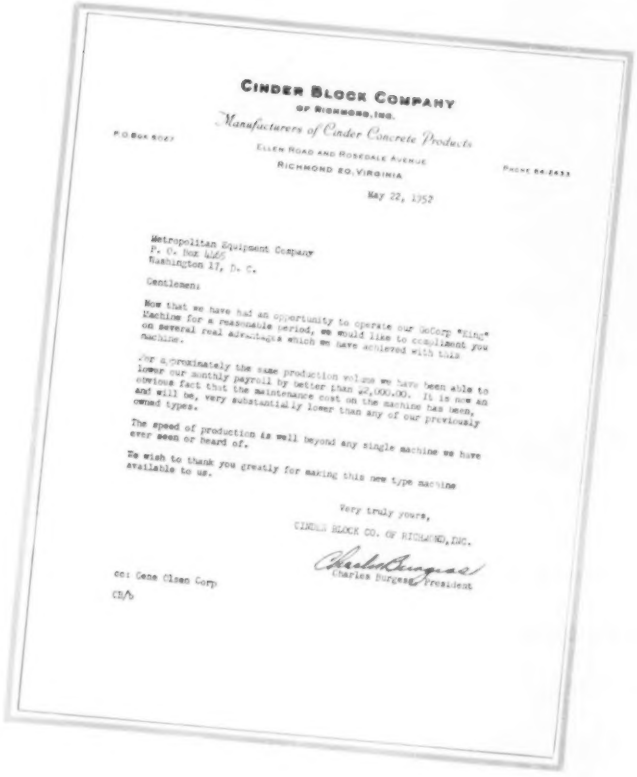


CINDER BLOCK COMPANY
OF RICHMOND, INC.
Manufacturers of Cinder Concrete Products
P.O. Box 6067 ELLEN ROAD AND ROSEDALE AVENUE
RICHMOND 20, VIRGINIA PHONE 64-6433

May 22, 1952

Metropolitan Equipment Company
P. O. Box 4165
Washington 17, D. C.

Gentlemen:

Now that we have had an opportunity to operate our GoCorp "King" Machine for a reasonable period, we would like to compliment you on several real advantages which we have achieved with this machine.

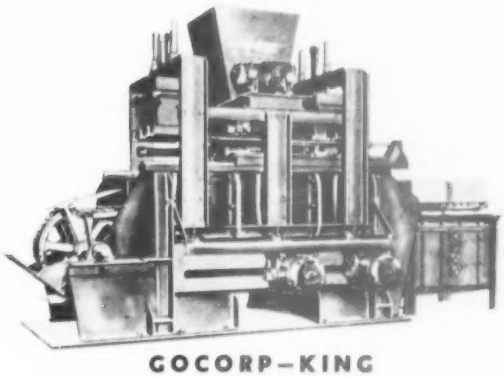
For approximately the same production volume we have been able to lower our monthly payroll by better than $2,000.00. It is now an obvious fact that the maintenance cost on the machine has been, and will be, very substantially lower than any of our previously owned types.

The speed of production is well beyond any single machine we have ever seen or heard of.

We wish to thank you greatly for making this new type machine available to us.

Very truly yours,
CINDER BLOCK CO. OF RICHMOND, INC.
Charles Burgess President

cc: Gene Clean Corp
CB/b



GOCORP—KING

- Designed by men who pioneered the major improvements of the past.
- Built, sold and backed by men you have known for years.
- Basic new principles of design mark the beginning of another era, as did the development of vibration 13 years ago.
- Production-tested in old established plants by practical, profit-minded operators who have purchased the machines.

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- Compact Construction
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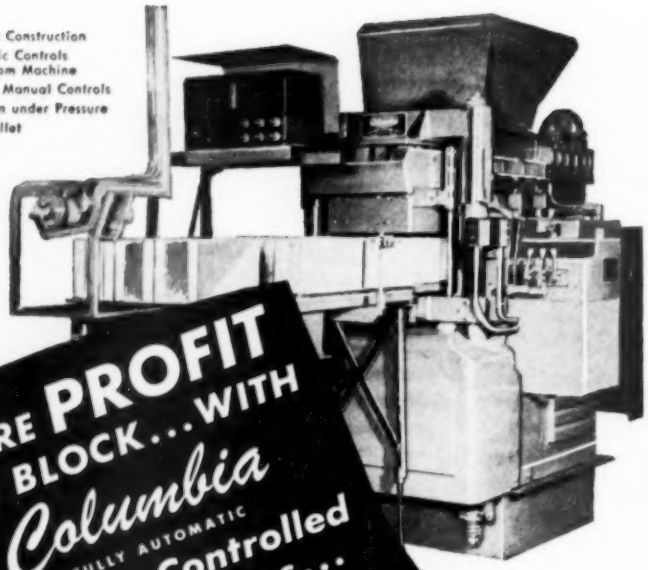
- Vibration under Pressure
- Plain Pallet



MORE PROFIT PER BLOCK... WITH Columbia FULLY AUTOMATIC Electronic Controlled Block Machines...

4 TO 6 CYCLES A MINUTE WITH Columbia AUTOMATIC CONTROL

LOW COST initial investment backed with low cost maintenance and rugged dependable construction means a wider margin of profit for the operator. Fully automatic with electronic controlled valves offers a flexible operation obtained in no other machine. Compare Columbia feature for feature... you'll buy Columbia!

Look at these features:

● Electronic controls... away from vibration yet within easy reach of the offbearer. ● Rugged, dependable plain pallet machine. ● Electronic controlled valves afford unheard of flexibility. ● Finger tip controls allow 4 to 6 cycles per minute. ● If necessary, manual operation instantly available. ● Vibration under pressure with electronic controlled oscillation and timing of the feed drawer. ● Blocks ahead of any machine of comparable production capacity! ● Approved and proven by successful operators throughout the country!

Write home office for name and address of sales representative in your area.

Columbia MACHINE WORKS

107 S. GRAND AVE. VANCOUVER, WASH.

BAUGHMAN

HI-SPEED JOB-FITTED Portable and Stationary CONVEYORS

Years ahead in design and construction.

Built better to last longer!

PROMPT DELIVERY.

Write for Catalog A-339.

BAUGHMAN MFG. CO., INC.

1121 Shipman Rd. Jerseyville, Illinois

Move MORE materials at LESS cost!

Model 230

the very quality most needed in this type of structure. It is furthermore doubtful if the limited exposure experienced by most prestressed units justifies the use of entrained air to improve durability.

In the fabrication of prestressed concrete, shrinkage should be held to a minimum. R. F. Blanks states that drying shrinkage is almost directly proportional to the water content and is not dependent on the cement or the water-cement ratio. Finer cements tend to increase shrinkage slightly. In general, shrinkage can be reduced by the use of medium coarse cement, about 1800 sq. cm. per g., together with the minimum slump at which satisfactory placement can be secured. Also in large sections because of the slower drying out there is less shrinkage than in smaller sections.

It also seems desirable to mention the effect of sustained loads on the breaking strength of concrete. It has been developed that concrete will withstand indefinitely only 70 percent of its breaking strength. The same investigations also show that concrete can withstand repetitively-applied loads of only 50 percent of the breaking strength. These are factors which require consideration by the structural designer in determining what should be the ultimate strength for a given working stress.

In designing and producing prestressed concrete units it is necessary to rely heavily on the information obtained from strength tests of cylinders. The making and handling of concrete test specimens should therefore always be in strict compliance with A.S.T.M. specified methods. Only a properly cast cylinder is a fair sample of the concrete, and carelessness in this department can result in loss both of time and materials.

It has been shown that a cylinder capped with soft material can test as much as 50 percent lower than companion cylinders capped with hard, strong materials. Large aggregate projecting above the top surface of the cylinder seems to cause lower strength readings even when the surface is leveled by capping. The Bureau of Reclamation also reports that specimens cast in molds having cardboard bottom and sides showed strengths about 9.5 percent less than those cast in steel molds.

The production of high strength concrete for prestressed units presents no new or unusual problems. We have only to apply what we have already learned of the technique of making good concrete with perhaps increased emphasis on slump control and obtaining accurate strength data on the finished product.

Prestressed Concrete

CONCRETE ENGINEERING CO., Tacoma, Wash., has started the production of prestressed concrete, by methods which have proved acceptable in Europe.

There's a big difference between LIGHTWEIGHT *and* UNDERWEIGHT

The difference is in performance. The Blaw-Knox Hi-Boy gives you all the big performance advantages of a standard, heavy-duty truck mixer, because that's exactly what it is. It's complete in every part necessary for efficient, maximum production, yet by careful redesign, the weight of the 3-yd. Hi-Boy has been reduced by a full ton, and the 4½-yd. model by half a ton!

BLAW-KNOX
Hi-Boy LITE WEIGHT TRUKMIXERS
are Standard, Complete Heavy-Duty Models

3-cu. yd. Hi-Boy weighs 5580 lbs.
4½-cu. yd. Hi-Boy weighs 6830 lbs.

Light weight is important, BUT . . . it takes a *complete*, standard truck mixer to handle every ready-mix job that comes along, and at a profit. The heavy-duty Hi-Boy is the lightest weight *complete* truck mixer on the market! Dead weight is eliminated, yet the Hi-Boy retains all the features and sturdy construction for peak performance that have made it first choice for so long, on so many jobs that call for big production at low cost.

With the lightweight Hi-Boy, you're sure of bigger payloads at lower cost per yard . . . and you have a heavy-duty truck mixer at a lower capital investment. For example, the 3-yd. Hi-Boy can be mounted on a single rear axle chassis of proper wheel base capable of carrying 18,000 lbs. total load, without exceeding legal limitations for weight on the rear axle.

It will pay you to get the low-down on the Hi-Boy today. Your Blaw-Knox distributor will give you complete details.

Ask about the 26 Hi-Boy LITE WEIGHT FEATURES THAT ASSURE
BIGGER PAYLOADS HIGHER PRODUCTION
LOWER MAINTENANCE BETTER AND EASIER OPERATION GREATER EFFICIENCY

***Check* the advantages of the BLAW-KNOX "Complete Package" of Ready-Mix Equipment**

Now you can get *all* your ready-mix equipment in one "Complete Package" . . . clamshell buckets, mixing, batching and charging plants, and Hi-Boy Trukmixers . . . all on one order, with just one financial arrangement and backed by one undivided responsibility. You have one competent distributor source for expert repair and maintenance, and prompt service on parts. Ask your Blaw-Knox distributor to explain every benefit of the "Complete Ready-Mix Package".

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BLAW-KNOX DIVISION
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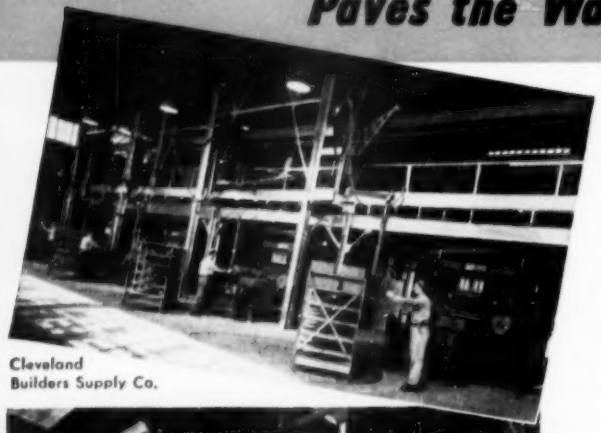
WATCH VIBRAPACS WORK!

The Amazing Performance of these Modern Machines Paves the Way for Additional VIBRAPACS



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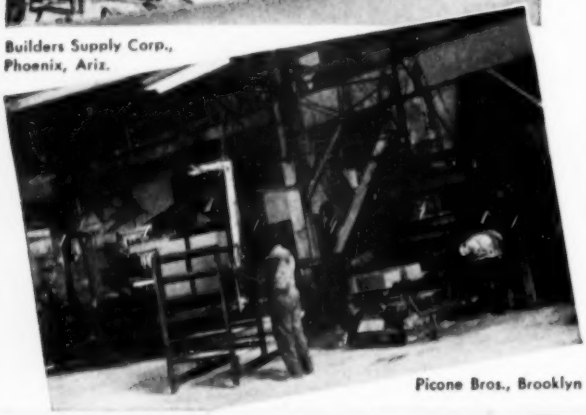

Picone Bros., Brooklyn

Besser Vibrapacs give you maximum production of high quality block, *automatically*. That's why so many Vibrapac plant operators come back for their 2nd, 3rd or 4th machine — or even more!

Press the starting button and three more block are ready for the curing room every few seconds. It's just that easy. The Vibrapac is fully automatic. No machine operator is required. No lost motions. No time wasted. Pallets and mixed materials are fed automatically. Three 8" x 8" x 16" modular block are produced at a time on one plain pallet. Smaller units, made in larger multiples, on the same set of plain pallets. As the block are completed, they are quickly transferred to the racks. One man, with the help of a Besser Power Off-bearing Hoist, does the job. No manual lifting! Off-bearer merely guides the hoist.

Besser representatives will gladly show you how you can step up production of high quality block with Vibrapacs. Write today.

BESSER MANUFACTURING CO.
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21 Concrete Products Plants Now Operate 4 or More VIBRAPACS

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Aldershot, Ontario, Canada
PICONE BROS.
Brooklyn, New York
SAN XAVIER ROCK & SAND CO.
Tucson, Arizona
BUILDERS SUPPLY CORP.
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BASALT ROCK CO., INC.
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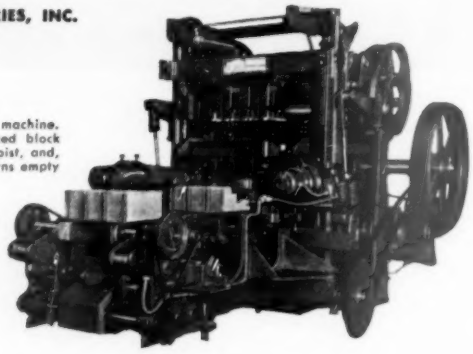
Front Pallet Feed Vibrapac
The fully automatic block machine. One man removes finished block with power off-bearing hoist, and, with no lost motion, returns empty pallets to Vibrapac.



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BATCH MIXERS | SKIP LOADERS | BLOCK & BRICK CUBERS | **SUPER VIBRAPAC** | SINTERING PLANTS | ACROW CENTERS | ROOF TILE MACHINE

Planning Your Plant

(Continued from page 138)

terials enter the mixer. At a batching plant, dust equipment should be placed between the discharge gate of the weigh hopper and the charging cone of the transit mixer. The purchase of cement recovery equipment will soon pay for itself, protect employes and prevent the listing of your property as a neighborhood nuisance.

(To be continued)

Western Concrete Products Meeting

THE CONCRETE PRODUCTS ASSOCIATION OF WASHINGTON held its 24th annual fall meeting in Yakima, Wash., September 12-13, 1952. The directors' meeting was held the first evening. One morning was devoted to meetings of the various committees to discuss and formulate plans for the coming year. At the afternoon meeting, after a short business session, the following reports were given:

John Roberson, research engineer, Division of Industrial Research, Washington State College, reviewed and summarized his studies on water hammer due to air action and his studies on compressive stresses in irrigation pipe lines resulting from dimensional change due to moisture. He reported that field observations have shown that compressive stresses in pipe lines have a definite bearing on the failure from air action. His studies indicated that the escapement of air from a restricted opening will produce water hammer in pipe lines. Field tests demonstrated that water hammer could be developed up to 5 p.s.i. It was his conclusion that both riser pipes and automatic air valves will produce this condition. Other conclusions drawn by Mr. Roberson were that the relief of compressive stress in pipe lines must be taken care of by expansion joints and that air vents of a size equal to the main line will relieve water hammer. He suggested the use of the dome vent on large lines as a means of reducing costs in installing air vents.

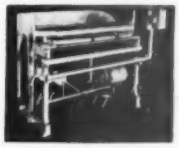
W. E. Cox, research engineer, Division of Industrial Research, Washington State College, reported that in connection with his research on acceptable coatings for masonry walls, successful tests have been made with "Siliclear" and "Daracone," two colorless silicone paints. These tests are in addition to the 40 tests listed in Bulletin 214, printed by the Division of Industrial Research. Mr. Cox dis-

(Continued on page 154)

Members attending the 24th annual fall meeting of the Concrete Products Association of Washington, held this year in Yakima

THE APPLEY LITTLE GIANT SLUMP BRICK AND SLUMP BLOCK MACHINE

- Simple Operation
- High Production
- Low Maintenance



- Vibration
- Interchangeable Mold
- Plain Pallet-Rack Feature

Makes from 6 to 15 Slump Bricks or Slump Blocks Per Cycle in Many Shapes and Colors. These Units are Made in Lengths of 8", 12" and 16", and to Vary in Thicknesses of From ⅞" to 4". Slump Units Effectively Replace or are Utilized with Standard Masonry Building Materials in Both Commercial and Residential Construction. Write for Literature.

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when you offer them a choice of
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CEMENT & MORTAR COLORS

Made by Williams, this is the broadest selection of fine Cement and Mortar colors on the market. By offering your customers a choice of 23 shades, you can quickly and easily settle upon one having the exact chemical and physical properties your color specification requires.

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Here you have a choice of 18 shades—6 Reds, 3 Greens, 3 Browns, 3 Yellows, 1 Black, 1 Blue, and 1 Orange. Each shade is manufactured to meet the most exacting specifications for cement work—as recommended by the American Concrete Institute and the Portland Cement Association.

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Here you have a choice of 5 different shades—one shade in double strength red, light buff, dark buff, chocolate and black. Each of these colors may be used with excellent results with any standard mortar mix or with a ready-made Bricklayer's Cement.

Write today for color samples and complete technical information on how Williams Cement and Mortar Colors give you superior results. Address Dept. 10, C. K. Williams & Co., Easton, Pennsylvania.

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COLORS & PIGMENTS

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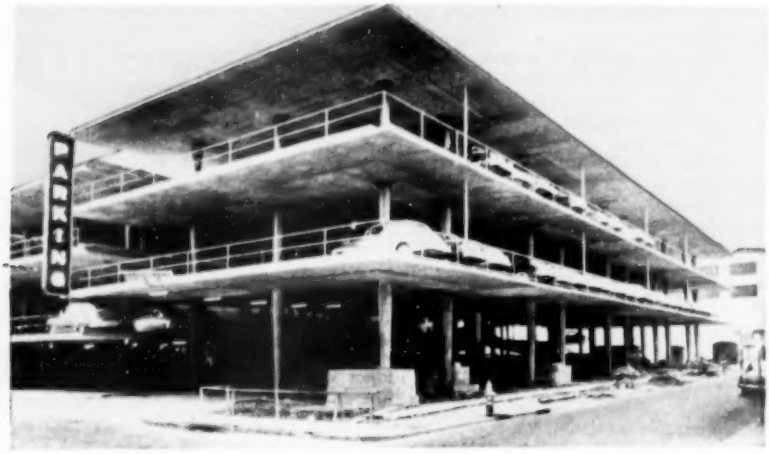
East St. Louis, Ill. Easton, Pa. Emeryville, Cal.

You need reputation to do a business of $500,000,000+

Although anyone can assemble some form of truck mixer, the ready mixed industry built its quality acceptance by standardizing on truck mixers and agitators of approved design, certified by Rating Plate. Insistence on this Rating Plate preserves these standards and safeguards your share of a business that exceeds $500,000,000 a year.

(Advertisement below is being read by your best customers in Architectural Record, Engineering News Record, Western Construction and Southwest Builder.)



New Orleans parking garage, built in 30 units, cost only $400 per car space. Unit is a 32' slab cantilevered on columns spaced 16'. Overlapped cantilevers between units span 32', make space for another car. In cross section slabs are 66'3", columns spaced 20'. Hinging columns at base eliminated bending moment, allowed tapering to gain space. Slab thickness averages only 7½", with only 5 lbs. of reinforcing steel per sq. ft. of slab.

A car for every 200 sq. ft. — all within 3 minutes of the street

Designed to provide quick-access parking for as many cars as possible within its site dimensions, this garage was built at extremely low cost in a series of 30 independent units, each a flat slab cantilevered on tapered columns hinged at their base, with overlapped cantilevers doubling the span between units.

Implicit in clean, light, economical construction like this is the closely calculated use of reinforcing steel in concrete of predetermined strength.

Such material is available in ready-mixed concrete of uniform batch design, processed in truck mixers or agitators which have the capacity, drum speed and mixing action, and the accuracy of water control necessary to insure proper and complete mixing of every batch. Such truck mixers are identified by Rating Plate.

Look for this Badge of Dependability on Truck Mixers: You have a right to insist on this Rating Plate on any truck mixer that serves your jobs. It is available to all who comply with the quality standards established by the National Ready Mixed Concrete Association and the Truck Mixer Manufacturers Bureau.

These member manufacturers comply with Bureau standards

BLAW-KNOX DIVISION Pittsburgh, Pa.	CONCRETE TRANSPORT MIXER CO. St. Louis, Mo.	THE T. L. SMITH COMPANY Milwaukee, Wis.
CHAIN BELT COMPANY Milwaukee, Wis.	THE JAEGER MACHINE COMPANY Columbus, Ohio	WORTHINGTON PUMP & MACHINERY CORP. Dunellen, N.J.

Cinder Block Meet

(Continued from page 139)

felt that in the years immediately ahead there might not be any good masons available who could do a top job of laying concrete masonry units, all of which would reflect against the concrete masonry industry. He told of plans in his area directed so that high school boys could receive a broad general basic knowledge of the industrial arts through the employment of a suitable and competent instructor. Mr. Dienhart, in the discussion, said the problem of having competent masons in the years ahead was national. It appeared that the problem is one that can be worked out with the unions for it is obvious that if there are no members in a union there are no dues with which the union can meet its obligations. Several producers spoke briefly of experiences in their areas directed at gaining attention to the general problem of an adequate supply of competent masons.

The balance of the day's session was devoted to merchandising with Loran B. Langsdale, Langsdale Advertising, Baltimore, Md., acting as moderator. Herbert Vincent told of a home design contest in Michigan which resulted in about 160 contestants (not architects) submitting plans. These contestants were mostly young men and had to be sponsored by an architect's office.

Trade marks and the need of catchy and descriptive tradenames for a plant's products were discussed by several members in broad terms. One member told of using television as an advertising medium and said that he was spending about 2 percent of his sales on all types of advertising. He noted that a 60-sec. "shot" on TV cost $100 and in that time 150 words and four slides were about all one could work into the program. He felt that the cost was too high for the results obtained.

Mr. Dienhart spoke of the large market available in the home building field and said that smaller block units, such as are common in Florida and California, pointed the way to better appearing structures for both internal and external exposures of concrete block. Sam Paturzo, Baltimore, Md., said that 70 percent of sales in the Baltimore area was for homes and that most of the block were used for back-up. In Alpena, Mich., it was said that 95 percent of the block sold are for homes. Mr. Condo spoke of the need for each manufacturer to mark his plant's output by some suitable identification.

The third day, devoted to machinery developments, opened with W. Shaw Phillips, Arthur Rehberger & Son, Inc., describing the Rehberger unloader for solving the unloading problem of concrete masonry units. He said that his investigations showed that it cost about 3½ cents per block to transport concrete block by con-

ventional methods and that by loading flat racks with lift truck and unloading with his company's unloader, this cost was being cut to as low as ⅜ cent. He gave several instances of savings of from $85 to $135 per unit per day by the use of the Rehberger unloader. Edward Meeker, M and M Engineering Corp., told of the use of a device, the Electrovisor, to insure a quality block and, at the same time, to up a Besser's capacity to 960 block per hour. He said that pallet thickness affected the height of a block and that pallets should be kept at a uniform thickness. George Oswald, Oswald Engineering Co., told of the vibration features of his adjuncts to Besser equipment which in one instance was getting 1154 units per hour; he also described briefly a block ejector. Arnold Jacobs, Lith-I-Bar Co., and Haakon Paulson, Besser Manufacturing Co., spoke respectively for their companies. The latter said that a new and better machine was in the offing at Alpena, and spoke briefly on the use of prestressed beams using concrete masonry block and Roebling wire rope as the basic segments of the beams.

Considerable discussion revolved about the specifications of the U.S. Army Corps of Engineers regarding the moisture content of block being kept at less than 30 percent (of total possible for the block to absorb) and of the need for protecting block in transit and on the scaffolds. Tarpaulins cost about $135 each and last one season. It requires three men to put the tarpaulin in place and three to remove it. Mr. Condo thought these costs might become a factor, especially if all users follow the trend set by the Corps of Engineers. It was brought out in the discussion that block manufacturers, in the future, might have to dry all their block and that once the block was adequately cured and then dried its expansion characteristics were reduced regardless of how many times the block was wet again. Drying under tin roofs was discouraged as it had proved inadequate as compared to sun exposed drying regardless of intermediate rain wettings.

BATCH & MIX on the job

use the WILLARD "TASK FORCE"

YOU BATCH ON THE SPOT with a self-loading Willard Weigh-Batcher! There's no need to haul concrete from a distant batcher plant...no need to erect an expensive stationary batcher.

YOU SET UP with no effort beyond digging a shallow pit for the foot of the conveyor. The Willard mobile Weigh-Batcher is self-loading to a predetermined weight. And its capacity is ample to keep two or more truck mixers busy.

YOU SAVE, too, with a Willard Truck Mixer. There is no auxiliary engine. The drum is geared to the truck motor. This allows two feet shorter wheel base—for short turns and more round trips. The rear axle loading with 3 yards of concrete meets the laws of all states.

THE "WILLARD WAY" is the time-saving way! You get more done with fewer men and machines. *Write for the "Willard Way" booklet.*

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Weigh-Batch Loader

WILLARD
Mixer Loading Conveyor

WILLARD Truck Mixer

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READY MIX *"the Willard Way"*

OSWALT SERVICE Scores again!

...with TWO NEW DEVELOPMENTS for Vibrapac Owners

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Takes the shock out of starting and stopping . . . insures gentle block travel . . . eliminates the cracking of green blocks . . . and reduces culls to a minimum.

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Enables operator to maintain uniform height and density of blocks.

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OSWALT ENGINEERING SERVICE CORP., 1335 Circle Ave., Forest Park, Ill. Phones: EStebrook 8-3666, FOrest 6-3898

tributed a progress report on "Dimensional Changes in Unit Masonry" and described the results of the tests.

Dr. R. L. Albrook, director of the Division of Industrial Research, discussed silicones and stated that the college is continuing its studies on masonry coatings and indicated it would be glad to test more samples.

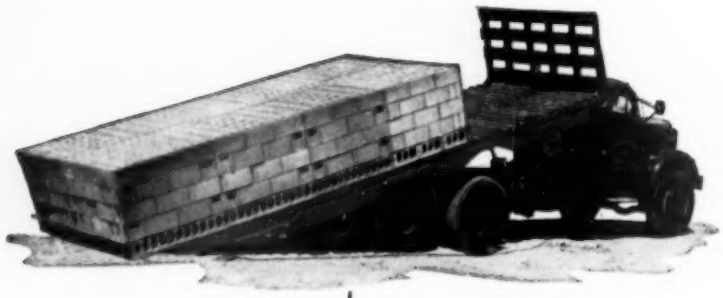
W. S. Wilson, Legislative Committee, and E. G. Lowry, Safety Committee, reported on the proposed activities of their respective committees.

J. B. Lundberg, Pipe Standards Committee, reported on the discussion on sewer pipe joints, held earlier at the meeting with the association directors. It was brought out that many different types of sewer pipe joints were in use over the area covered by this association. It was suggested that this committee contact all member plants and get information on all the various types of joints in use and tabulate and study to see if some agreement could be made on a single sewer pipe joint which the association could establish as a standard.

N. A. Moberg, Advertising and Public Relations, reported that his committee recommended a continuation of the present program of advertising, consisting of a weekly advertisement in the Seattle *Daily Journal of Commerce*, *Concrete Products Stories*, *Pictorials*, *County Commissioners' Yearbook* and *Puget Sound Engineering Bulletin*.

Verne Frese, Block Standards Committee, briefly outlined the architectural specifications which were proposed as an addition to the "Recommendations for Concrete Masonry," and was authorized to have them printed.

Carl Smithwick, president of Smithwick Concrete Products, Portland, Ore., a national director of N.C.M.A. and an associate member of Concrete Products Association of Washington, was called upon to discuss the formation of a regional N.C.M.A. group. Mr. Smithwick stated that, at the summer meeting of the directors of the National Concrete Masonry Association, W. P. Markert, director of promotion for that organization, suggested the formation of a northwest



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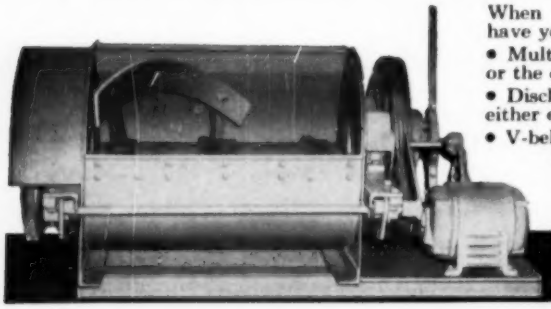
320 FERRY STREET, NEWARK, NEW JERSEY
VEHICLE ENGINEERS FOR 66 YEARS

only MULTI-MIXER gives you a choice!



When you buy Multi-Mixer you have your choice of:

- Multi-blade paddle arrangement or the conventional spiral blades.
- Discharge door in the rear or either end, controlled front or rear.
- V-belt drive or direct drive motor, and right or left hand drive.
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All Multi-Mixers are of welded steel construction, in standard sizes from 3 to 60 cu. ft., and larger sizes to your specifications. Ask for Bulletin MM-11. Multiplex also makes fully automatic block machines, skip loaders, and compartment aggregate bins.

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branch of the N.C.M.A. It was decided that a special meeting of producers should be held to discuss the proposal.

Concluding the afternoon session was a talk on the construction and operation of the various irrigation units in the Yakima Valley by Cyril Lentz, assistant superintendent, Yakima Project, U.S. Bureau of Reclamation.

Appointed Manager

WESTERN BRICK AND SUPPLY CO., Lincoln, Neb., has announced the appointment of Jess O. Weyand as manager of its manufacturing and distributing facilities at Hastings, Neb.

Mr. Weyand, who holds a B.S. and M.S. in mechanical engineering, from the University of Nebraska, was assistant chief engineer for Windcharger Corp., Sioux City, Iowa, from 1941 to 1943. From 1943 to 1946, he held a commission in the Naval Air Force and, from 1946 to 1950, was general manager of Chase Plow Co., Lincoln, Neb. Following this he was safety director for the Nebraska Department of Labor.

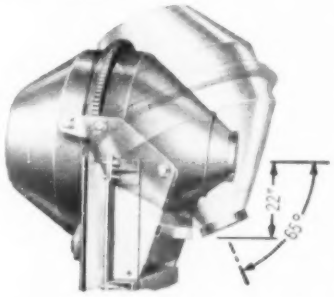
Western Brick and Supply Co. operates a concrete masonry and ready-mixed concrete plant, a clay products plant, and a distribution warehouse at Hastings. It also operates distribution plants at Lincoln, Omaha and Nebraska City; a concrete masonry plant at Lincoln; and aggregates plants throughout the state.

Burmeister

"TILT-UP" MIXER

CUTS PLANT HEIGHT AS MUCH AS 8 FEET

Burmeister's patented "tilt-up" feature—which reduces the mixer's headroom requirement—permits lower plant heights. This means easier crane loading, lower power costs, lower initial costs, less costly "conversions," increased portability, and better over-all control.



● In addition to reducing plant height, Burmeister's 3 cu. yd. "Tilt-Up" Mixer (left) provides a steeper 65° discharge from one spot, eliminates segregation of concrete and the danger of accidental discharge. It is simple to install, and has an integral hydraulic system—no compressor is required. Write for name of your nearest Burmeister Distributor, without obligation.

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Continuous Profits Through Efficient *Automatic* Operation

KENT CONTINUOUS MIXERS

perform their function with the *greatest known efficiency* and do so *with the least possible attention.*

They are *not an expense* but an *investment that pays dividends* by continuously assuring greater profits through consistently low unit costs.

FEEDING—Up to four aggregates can be fed with the proportion of each controlled by an adjustable gate.

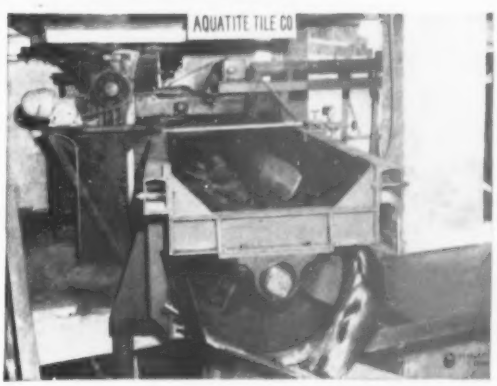
Once set, readjustments are rarely required for the same aggregates. Calibrations permit the recording of adjustments for future quick reference and guidance.

MIXING—The number of mixing paddles, their positions on the shaft and the angles of the blades, are all variable.

The amount of "slicing" and "turning over" and the length of time the aggregate is retained during the mixing cycle are variable up to 12 minutes.

WATERING—This important operation is variable, too.

The aggregates can be pre-wet or watered during the mixing process as desired.



DISCHARGING is automatic, too. There is no timing, no watching and no levers to operate as with batch mixers.

Isn't this machine worthy of your immediate investigation?

The **KENT MACHINE CO.** Cuyahoga Falls, Ohio Concrete Products Machinery Since 1925

You Can't Match McCracken FOR CONCRETE PIPE PRODUCTION

1. Doubles production in all sizes 4" to 36".
2. Handles 90% of suburban market—80% of metropolitan market.
3. Does twice the business with half the inventory.
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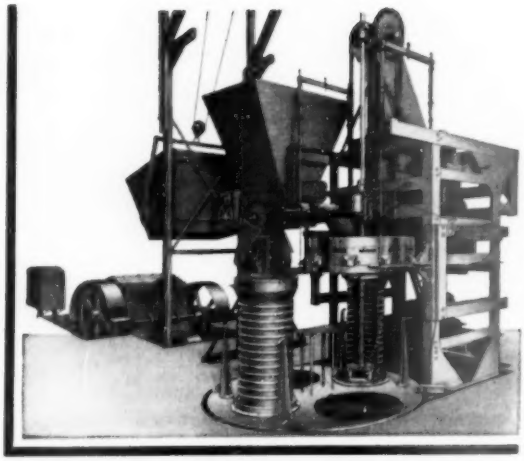

MODEL "T" (Pictured Above)—4" to 36"; MODEL "R"—4" to 18"; MODEL "D" for Drain Tile—sizes 4" to 16"

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HI in Quality—LO in Cost

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3 CUBIC YARD MIXER
4½ CUBIC YARD AGITATOR

Only with Visible Mixing do you maintain maximum uniformity, greater flexibility, speed and production. Rotor action produces a kneading, folding, blading which provides a homogenous mix.

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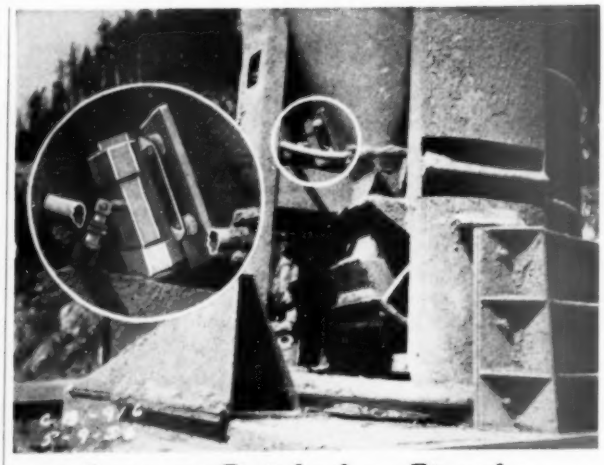
Serving the CONCRETE INDUSTRY OVER 20 YEARS



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KENT STEDIFLO CONTINUOUS MIXER, with extra length 12' barrel, screw cement feed, solenoid water control, etc. . . A REAL BUY.

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Dunn 16' Mixer with Skip Hoist and motor, complete.

Portable space heater, 40,000 BTU.

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LOWER COST
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WANTED PLAIN STEEL PALLETS

800—1/4" or 5/16" X18 X18

Give—Condition, Size and Price

BUILDERS PRODUCTS, INC.
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With FORMULA NO. 640
A clear liquid—7 different resins in a solvent which penetrates 1" or more into concrete, concrete blocks, stucco; seals, holds 1250 psf water pressure. Applies quickly — no mixing — no furring — no membranes—no cleanup. Use on forms—wood or concrete.
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F M C — 180 Automatic Block Machine, w/4" — 8" — 12" attachments, also spare 8" Mold Box factory rebuilt and spare 8" vibrator. Kent Flowmaster #4 Continuous Mixer.
Grout hopper on steel mounting and grout elevator.
35—Steel racks w/decks.
Price of above complete, $3000.00 or will sell separately.
12 Cu. Ft. Batch Mixer — F M C make — Price $700.00.

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Concrete Pipe Plant in Northwest Florida has opportunity for plant superintendent. Must have complete knowledge of concrete pipe machinery. In reply, state experience, etc. . . Good opportunity for willing man. BOX L-16, CONCRETE PRODUCTS, 309 W. Jackson Blvd., Chicago 6, Illinois.

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1000—12" Hansom
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1 Senior Go Corp Block Machine
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Mold boxes for 4", 8", 12"
Less than 1 year old.
Subject to prior sale.

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PRESSED STEEL PALLETS
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25 ft. Besser Mixer, Newly rebuilt with all new parts, with or without 25 HP motor; also Stearns 28 ft. vertical skip hoist with all controls, motor, etc., good condition—discharges 11½ ft. above floor. Will sell both together.

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DUNBRIK machine, excel. condition, 16 cu. ft. mixer, 10 horse just rewound motor, 18 rubber tired carts good 4 others need repair, lots of repair parts and 9300 steel pallets to make 9 sizes brick and patio stones will make 22,000 brick per day. Patio stones to 12 x 24

DUNTILE machine to make increasingly popular french tile any color, used only 6 months, 10 cu. ft. mixer, 6 rubber tired carts good, all carts disassembled, 14' belt conveyor, 2 floor jacks, lots of repair parts and 1500 steel pallets. New cost about $40,000. Buy pallets, give you machinery or total of $9,900. Half down to good party. Other business interests and unable to get proper management. Sale of patio stone alone should clear this machinery in one year. BOX L-15, CONCRETE PRODUCTS, 309 W. Jackson Blvd., Chicago 6, Ill.

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COMPLETE EQUIPMENT FOR MAKING 3,000 CONCRETE BLOCKS PER DAY.

All equipment in first class condition and ready to operate.

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DUNBRIK MACHINE COMPLETE—hoist, mixer, motors, Dunstone double and triple brick attachment. 22 Dunbrik steel trucks, (15,840 brick capacity), approx. 6200 steel pallets. Industrial mat glazing machine.

KISSAM-BLATT BLOCK MACHINE COMPLETE—mixer, motors, conveyor, hopper and 3 way chute. 24 Block racks, approx. 1200 pallets. TRUCK-MAN LIFT TRUCK.

A. PAUL TABLIN
35 51st Street, Weehawken, N.J.

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- ► Lowers Your Costs
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To speed up operations, increase output and permit use of concrete in shorter time — especially in cold weather — add Solvay Chloride to your Portland Cement concrete mixes. Works equally well with all Portland Cements, including standard, high early, air entrained and low heat cements.

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Allied Chemical & Dye Corporation
61 Broadway New York 6, N.Y.

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Northrop Aircraft Plant, Anaheim, Calif.; Archt., Engr. & Contr.—Wm. P. Neil Co., Los Angeles, Calif. Pozzolith Ready-Mixed Concrete supplied by Western Concrete & Equipment Co., Los Angeles, Calif.

POZZOLITH READY-MIXED CONCRETE.... better, faster, in Tilt-Up Construction

Pozzolith Ready-Mixed Concrete is used extensively in tilt-up construction because it helps builders produce units faster and aids in overcoming shrinkage, crazing and cracking.

In tilt-up construction, as in all types of concrete work, Pozzolith Concrete provides these important advantages:

- EASIER PLACEABILITY — for lower placing costs
- MINIMIZED SEGREGATION — for better appearance
- REDUCED SHRINKAGE — for less cracking
- LOWER PERMEABILITY — for less "waterproofing" expense
- INCREASED BOND-TO-STEEL — for better construction
- GREATER DURABILITY — for longer life concrete

Whatever your concrete requirements, Pozzolith will enable you to obtain them *better and at lower cost* because it reduces the unit water content of the mix.

Write for full information on Pozzolith and the importance of low unit water content.

the MASTER BUILDERS Co.

CLEVELAND 3, OHIO — Subsidiary of American-Marietta Company — TORONTO, ONTARIO

STEARNS 15 Brings Florida Block Plant Up to the Minute!

BROWARD QUARRIES, INC.
FORT LAUDERDALE, FLORIDA

July 31, 1952

Stearns Manufacturing Company
Adrian, Michigan

Gentlemen:

Just about a year ago, Maule Industries, Inc. of Miami, Florida, took over the management of Broward Quarries, Inc. of Fort Lauderdale, Florida, which had been operating an older Stearns block machine.

To immediately modernize the block production and bring it up on a par with the other block producers in the community, a Stearns 15 was purchased and installed in September 1951. It has proved most satisfactory from every standpoint.

The production rate is high (approximately 900 per hour), and the block produced is of very high quality from the standpoint of low absorption and compressive strengths that run over a thousand pounds. It is equipped with the Stearns pallet return and Stearns double pallet off-bearer, which permit the elimination of one man normally used around the machine. In fact, we were so pleased with the pallet return and off-bearer that an experimental unit was installed at the Maule Plants in Miami and the results have been up to expectations. A Stearns 50-cubic-foot Mixer is also working most satisfactorily at Maule's Red Road plant.

Our relationship with Stearns has been most pleasant. Their representatives are fine men to work with. They keep their promises on delivery and always have the most accurate information. We are pleased to recommend both the organization and their equipment to anyone who is interested in low-cost, quality block production.

Very truly yours,

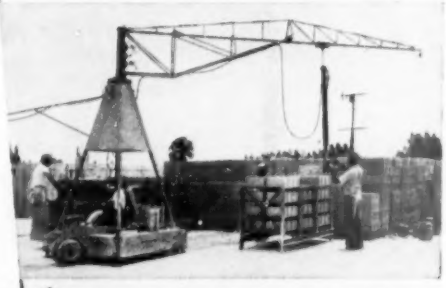
BROWARD QUARRIES, INC.

F. Paul Anderson
General Superintendent

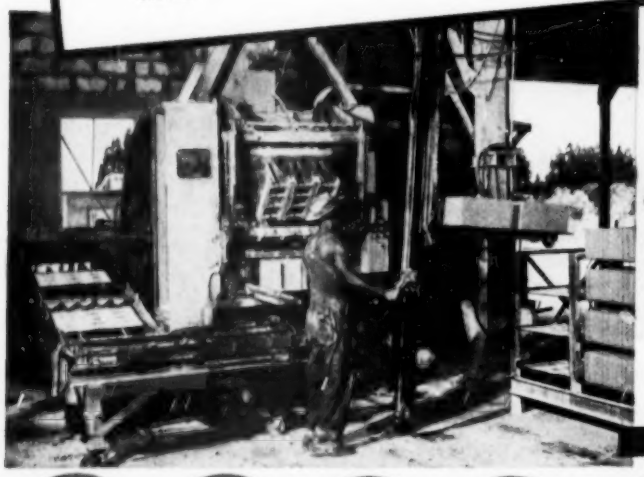
FPA:mw

STEARNS 15—A NEW ADVANCE IN CONCRETE PRODUCTS MACHINERY FOR THE LARGER PLANT

Fully Automatic • One-Man Operation • Finger-Tip Quality Control • 3-Blocks-per-Cyle • Adjustable 4-6 Cycles-per-Minute • Unidirectional Vibration under Pressure • Power Pallet Handling • Plain Pallets • Sturdy, Rugged Mechanism • Heavy Frame Members for High Stability • Dependable • Low Maintenance • Economical • Beautiful Blocks with Higher Compressive Strength, Lower Absorption, Sharp, Clean Edges and Corners.



Part of Broward Quarries' yard in Fort Lauderdale, showing Stearns 15 blocks ". . . of very high quality from the standpoint of low absorption and compressive strengths that run over a thousand pounds." That's a Stearns Yard Hoist, too.



HERE IS THE STEARNS 15 IN ACTION which the General Superintendent of Broward Quarries, Inc., Fort Lauderdale, Florida, praises so highly. Left is the Stearns Pallet Return and right, the Offbearer, which operate so easily and efficiently that another unit of the same kind has been installed in an affiliated concrete block plant in Miami, already employing a Stearns 50-cu. ft. Mixer.

OWNERSHIP the Key to SUCCESS!

STEARNS
MANUFACTURING COMPANY • INC
ADRIAN • MICHIGAN

STEARNS 15 | STEARNS 50 | ZIPPERS | JOLTCRETES | MIXERS | SKIP LOADERS | TURNTABLES | SINTERLITE

CLASSIFIED ADVERTISEMENTS

STOCK SPECIALS
For Sale or Rent

1—P & H Model 700, 1½ yd. Crawler Crane, 50 ft. boom, Gas Power. Good Condition.

1—Osgood, 1 yd. Crawler Hoe & Crane, 50′ boom, Gas power. Good Condition.

2—Bay City Model 45 Crawler Hoe-Shovel, Gas Diesel power. Late Model.

1—Buckeye Model 70, ¾ yd. Crawler Hoe & Shovel. Late model, Diesel power.

1—Lorain Model 40 Shovel, ¾ yd. Crawler Crane & Hoe, gasoline power, rebuilt.

1—Byers, Model 83, ¾ yd. Crawler Hoe or Crane, gasoline power. Rebuilt.

1—Bay City Model 30, Heavy Duty ½ yd. Crawler Hoe—Shovel, Gas Power. Good Condition.

1—Bay City Model 25, ½ yd. Crawler Hoe - Shovel, Gas Power. Good All Around Condition.

1—Bay City Tractor Shovel, Hoe or Crane, "Pup" ⅜ yd., ¾ swing, Crawler mounted, gasoline driven.

1—Browning Truck Crane on Hendrickson Carrier, 10 — 11:00 x 20″ tires, 45′ Boom, 17½ ton capacity. Late Model. Excellent Condition.

1—Universal Truck Crane, 28 ft. Boom, mounted on A. C. Mack Chassis. Single Axle rear.

1—P&H 255A Hoe Attachment. Clamshell Buckets, ⅜ to 2 cu. yd., also several Crane Booms — Trench Hoes and Shovel Attachments. Assorted makes.

Check on what you may require.

Eugene P. Reading, Inc.

Walnut St. & B & O R.R.

Roselle, New Jersey

Chestnut 5-0200 — New Jersey

IT'S THE COMPANY BEHIND THE MACHINE THAT COUNTS

Our 35th Year

ROTARY KILNS:

3—6′ x 60′ Bonnot Co. complete; ½″ shells, each with or without 3′ x 50′ Rotary Cooler. By installing lifting flights these kilns would make excellent heavy duty dryers.

1—7′ x 45′ Link Belt Kiln, complete; 7′6″ x 125′; 1—8′ x 135′ Allis-Chalmers.

ROTARY DRYERS:

4—Ruggles-Coles Direct Heat — Class XF4 — 54″ x 25′, two Class XF—5′ x 40′. Also L-B 2′7″ x 10′ Roto Louvre; three 3′ x 50′; 5′ x 30′, 5′ x 50′, 6′ x 40′, 6′ x 60′, 7′ x 70′.

4—6′ x 50′ Louisville Rotary Steam Tube.

CRUSHERS:

Jaw; — 12 x 20″ Birdsboro all steel; 2″ x 6″, 6″ x 15″ Sturtevant; 18 x 36″ and 24″ x 36″ Farrel; 42″ x 48″ Traylor; 48 x 60″ Traylor.

Rolls: — 42″ x 16″ Allis Chalmers Type B; 24 x 32″ Penna. single roll.

Portable Plants: — Cedar Rapids 1036-BBB; 2540-AAAA, 2036-AAA, also Pioneer with 30 x 42″ primary and secondary crushers, all Diesel driven.

PULVERIZERS:

1—#5047 Raymond High Side, 5 rolls, complete with 100 HP motor.

2—#5047 Raymond, 4 rolls, each with separator, exhauster, cyclone, piping and two 50 HP 3/60/2200V motors.

6—No. 1, #0, 00, 000 Raymond.

3—#0, 00, and 8″ Raymond Screen Mills.

4—Mikro #2SI, 2 TH, 4 TH.

BALL AND TUBE MILLS:

4—Tube Grinding Mills, made by Traylor E. & M. Co.; Allentown, Pa. Silex lined, 4′ x 13′, 4′6″ x 18′6″, 5′ x 22′ and 5 x 20′.

Also two 5′6″ x 20′ iron lined, with motors.

8—Pebble Mills, porcelain lined; 3—6′ dia. x 8′, 800 gals. each. 1—6′ x 5′; 3—5′ x 4′, each with ball charge.

AIR SEPARATORS:

2—Raymond 6′ and 16′ dia., 1—8′ Gayco; 1—16′ Sturtevant.

VIBRATING SCREENS:

3—Selectro 3′ x 6′ 2-deck, 1—3′ x 6′ 1-deck, all totally enclosed, heavy duty.

1—3′ x 6′ Colorado Iron Works, 1-deck.

1—4′ x 8′ Tyler Niagara, 3 decks.

8—Tyler Hummer, 3′ x 5′, 4 x 5′, 4 x 10′. Also #38 4′ x 10′.

DORR CLASSIFIERS:

2—Two stage Washing Classifiers, each with two rakes in tandem, in steel trough 26′ x 6″ long x 3″ wide, with drives.

1—6′ x 14′ Hardinge Rotary Counter Current Classifier, also used for dewatering and scrubbing.

Also Shovels, Cranes, Draglines; Jaw, Gyratory and other Crushers; Symons and Telsmith Cones; Complete Portable Crushing Plants; Rotary Kilns and Coolers; Air Compressors; Conveyors; AND FULL LINE OF CHEMICAL PROCESS EQUIPMENT.

CONSOLIDATED PRODUCTS COMPANY, INC.

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BArclay 7-0600

Special Crushers ! !

Raymond High Side 4 roll Pulverizer, No. 5047
Pennsylvania C-4-30 Reversible Hammermill.
Cedar Rapids 4033 Hammermill. Diesel powered.
Raymond No. 412 bowl pulverizer mill.
FARREL BACON 36″ x 48″ Jaw Crusher.
Dixie No. 3610 Premier Non-clogging Hammermill.

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Morris 10″ elec. with cutter. Steel hull—49′x9′x5′.
Ellicott 8″ with cutter. Diesel Hull 48′x18′x3′6″.
8″ Hydraulic. Diesel. On 32′x8′ steel pontoons.
Amsco 10″ Diesel power portable. Excellent.
6″ portable Diesel complete with cutters, etc.
8″ H-P twin Diesel drive. Complete.

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3 Koebring 4 yd. tilting mixers complete.
Smith 56-S two yard tilting mixer. Complete.
Cleaver-Brooks packaged automatic boiler 125 HP 150 p.s.i.
B-K, P-4120 3 compts. agg. one for cement.
Large plant 2½ yd 6 compts. agg. & cement elevators, 56-S Mixer.
Large plant 400 yds 5 compts. two mixers
NEW F-S 100 ton agg. bin 3 compt.
NEW F-S 400 bbl. cement bin complete.

CRUSHING PLANTS

Iowa Model 2A Crushing and Screening plant.
Cedar Rapids Model CCC 4024 plant. Diesel pow.
Pioneer 54-VA Port. with 12″x24″ Jaw crusher.
Telsmith Primary Port. 25″x36″ jaw crusher Diesel.
Pioneer Secondary Plant. Port. 100 T.P.H. 1¾″.

CRUSHERS

JAW: Acme 10x20, 14x26, 14x28, 10x42, 16x32, 18x32, 25x40. Eagle 20x36. Diamond 24x36". Cedar Rapids 10x20, 20x36, 25x40. Farrell 10x20, 13x30, 14x36, 18x36, 36x48. Buchanan 36x42. Good Roads Reliance 15x30. Traylor 18x36, 24x36. Allis-Chalmers 30x18. Good Roads 10x30. Telsmith 18x32. Champion 1030, 1040, 1236, 1530.
GYRATORY: Allis-Chalmers-McCully, 6″, 7½″, 8″, 9″, 12S, 20″, 30″, 42″, 14″, Newhouse, 24″, 36″, Gyrasphere, 18″, 28″. Intereone Telsmith, Telsmith 5H, 10-B, 13-B, 16-B. Kennedy Van Saun 7, 19, 25½-S, 37. Traylor Ty 1′8″. Ty 2′4″, Ty 4½″.
ROLL: Allis-Chalmers 54x24. Diamond 40x22. Pioneer 30x18. Telsmith 24x16. Pioneer 30"x18". New Holland 24x16.
HAMMERMILL: Size 4 Williams Jumbo, Pennsylvania 8X2, 22x22. Cedar Rapids 20x33. Jeffrey 36x42. Jeffrey 36x24, 36x40. Dixie 3650.
BALL MILL: Allis-Chalmers 4′x4′, 5′8″x18′, Kennedy Van Saun 7′x5′. New 4′x4′. Hardinge 6′x4′; Colorado Iron Works 5′x6′; Marcy No. 64½. Hardinge conical 10′x36″.
ROD MILL: March 2′x6′, 3′x6′. Allis-Chalmers 4′x8′. Hardinge No. R-206. Marcy 8′x12′, Hardinge 8′x22″.
CONE: Symons 2′ coarse bowl, 4′ standard coarse bowl.
TUBE MILL: Smith 16B 5′6″x20′. Denver 3′x8″.
DRIERS: McNeil 5′x50′. Hardinge 90″x60′. Cummer 66″x50′. Perkins 8′x70′, 10′x90′.

SHOVELS—CRANES—DRAGLINES

N-W 80-D 2½ yd. Dragline. Diesel. 100′ boom.
N-W Model 6, 1½ yd. Diesel Shovel.
Lima Mod. 34, 1 yd. Shovel-Crane-Dragline. Gas.
Link-Belt K-375 2 yd. Diesel Dragline.
Northwest 80-D Diesel Shovel 2½ yd. Recond.
Link Belt K580 Shovel 1946—practically new.
P&H Model 855, 2 yd. Diesel Shovel.
Bay City 45 Shovel-Backhoe-Crane. Diesel.
Lima 1201, 2¼ yd. Diesel Shovel.
Lorain 180 Shovel, 1⅜ yd. complete overhaul.
Link Belt K 595 dragline, 2½ yd., 8 ft. boom.
Lima 802, Shovel Crane Drag, 2 yd. Diesel.
Koebring ⅝ yd. Diesel Shovel.

SCREENS AND FEEDERS

Symons 4′x10′ 3 deck.
Diester 4′x10′ 3 deck.
Tyler Hummer 3′x5′ with motor generator.
Acme 5′x12′ Revolv. Scrub-Scalp Screen.
Pioneer 4′x10′ Scalping Screen. New 1946.
Robins 4x14 Vibrex Double Deck Screen.
Traylor Apron Feeder 5′x15′, heavy duty.
Reciprocating Feeder 4′x19′, with motor.

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Cat. D7 Traxcavator. Rebuilt.
Cat. D6 Traxcavator. Rebuilt.
Cat. D4 Traxcavator. Rebuilt.
Cat. D2 Tractor 50″ Traxcavator. Rebuilt.

LOCOMOTIVES

45 ton G.E. Diesel Elec. Loco. std. ga.
25 ton Plymouth gas loco. std. ga.
12 ton Plymouth gas loco. std. ga.
8 ton Plymouth gas loco. std. ga.
25 ton Vulcan steam std. ga. Side tank
15 ton Whitcomb 36″ ga. gas.
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American Terry 20 ton Guy Derrick 100′ ton.
Clyde 30 ton stiff leg 90 ft. boom.
Guy Derrick 15 tons 115′ mast 105′ boom
American 25 ton stiff leg derrick 90′ boom.
Special 35 ton stiff leg derrick 100′ boom.
American Model 10-80, 20 ton Guy.
American 30 ton stiff leg 100′ boom.

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Butler 100 yd. Bitu. Concrete plant.
Cedarapids 60″x24′ asphalt plant drier. Compl
Madsen 4000# complete plant Diesel powered.
Model S-100 Simplicity. Diesel powered.
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McCarter complete plant 3000# capacity
Cedar Rapids Model FA portable plant.
Cummer Semi-Port. ⅝ ton Pugmill.

CABLEWAY

Sauerman slack line 1¼ yd.; electric 90′ mast.
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Sauerman 1 yd. with Waukesha gas hoist.

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Write—phone—wire in advance. Almost everything in stock and ready to go.

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Heavy duty eccentric-shaft types; 1 to 5 decks, 3'x8' to 5'x14'. Others from 2'x4'. Wire cloth or plate included to your specifications.

Priced from $431.00

CINDER, PUMICE, PERLITE CRUSHERS

10 to 20 tons per hour capacity	$ 479.00
25 to 50 tons per hour capacity	1144.00
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Complete with hoppers.

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Complete with motor and drive, 15 to 225 tons per hour capacity. Priced from $423.00

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20 Ton Truck Scales	$617.00
26 Ton Truck Scales	684.00
33 Ton Truck Scales	895.00

Others to 50 ton capacity. All scales complete with structural steel. Parts and weighing beams for most makes of motor truck scales.

BUILD YOUR OWN CONVEYORS AND BELT FEEDERS

3-roll Troughing Idlers for these sizes:

14" belt	$16.50	24" belt	$18.75
16" belt	17.25	30" belt	19.50
18" belt	18.00	36" belt	20.25
42" belt	$21.00		

1-roll Return Idlers for these sizes:

14" belt	$ 6.38	30" belt	$ 8.25
16" belt	6.75	36" belt	8.75
24" belt	7.50	42" belt	9.50
48" belt	$10.25		

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Complete with frame, pulleys and bearings in one piece ready to install.

CONVEYOR BELTING

Famous brands at deep cut prices. 30 Day Sale. Subject to stock on hand.

Heavy duty, abrasive resistant rubber covers vulcanized to the impregnated cotton duck carcass for utmost performance and to avoid mildew from moisture and atmospheric conditions. Each ply thoroughly embedded in rubber to prevent ply separation. Troughs easily, gauge resistant, for long, short and slope installations.

Width	Ply	Thickness Top Cover	Thickness Bottom Cover	Type of Duck Carcass
18"	4	1/8"	1/32"	28 oz.
24"	4	1/8"	1/32"	28 oz.
30"	4	1/8"	1/16"	32 oz.
42"	5	1/8"	1/16"	32 oz.
48"	4	1/16"	1/32"	28 oz.

ELEVATOR TRANSMISSION AND V-BELTING

WRITE FOR CATALOG & PRICES OF NEW EQUIPMENT. ALSO LIST OF GUARANTEED BARGAINS.

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Shop No. 6183
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Shop No.'s 1275 & 1276
Prices very attractive

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30 INCH 1-136'—1-270'—2-350'—1-418'—2-500'—1-1100' & 2-1500' Long.
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42 INCH 1-144'—1-290'—1-377'—1-575'—2-700'—1-800'—2-1500' Long.
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CLYDE HYDRATOR WITH KUNTZ CONTINUOUS DUSTLESS SYSTEM, 4-5 T.P.H.
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NO. 4 CLYDE BATCH HYDRATOR.
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4 x 20 & 4 x 45
& 6 x 60 & 5½ x 7 x 60.

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65 TON G.E. DIESEL ELEC.
45 TON PLYMOUTH DIESEL.
10 TON DAVENPORT GAS.
20 TON WHITCOMB GAS.
65 TON WHITCOMB DIESEL ELECTRIC.
6 TON BROOKVILLE DIESEL.
2 100 TON G.E. DIESEL ELEC.
4 TON BROOKVILLE GAS.

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30 TON INDUSTRIAL GAS.
20 TON ORTON GASOLENE.
25 TON INDUSTRIAL STEAM.

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48 x 60 SUPERIOR JAW CRUSHER.
24 x 36 FARRELL JAW CRUSHER.
42 x 48 SUPERIOR JAW CRUSHER.
18 x 36 FARRELL JAW CRUSHER.
5308 ALLIS CHALMERS FINE REDUCTION.
3 FT. TY TRAYLOR FINE REDUCTION.

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1—16V Pioneer Portable, 350 ton cap.
1—30" x 42" Austin Western Primary Diesel
1—10" x 36" Wood Secondary Diesel
1—15" x 36" Diamond Primary & Secondary
1—15" x 36" Farrell Elec. & 24" x 120' conveyor

BLAST HOLE DRILLS

3—B.E. 29T ELECTRIC.
1—BUCYRUS ARMSTRONG 12 BIT DRESSER.

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--anywhere!

"We look into the earth"

PENNSYLVANIA DRILLING COMPANY
Pittsburgh 20, Pa.

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2036 Cedarapids AAA primary unit on rubber
1036/2418 Cedarapids Jr. Tandem unit
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4024 Cedarapids roll, rebuilt
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1236 Cedarapids Model 6C plant, new.
10x7 Allis-Chalmers Blake type jaw crusher.
#1 Cedarapids Kubit impact breaker.
3' x 6' Kennedy Van Saun triple deck screen.
4' x 6' Kennedy Van Saun single deck screen.
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15 cu. yd. Cedarapids sand drag, new.
36" Wemco single screw, new condition.
16" x 90' bucket elevator.
60-ton, 2-compartment, 8'x18' storage bin with clamshell gates.
Special bins to your specifications.
Conveyors—18"—24"—30"—36". Also belt.

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Osgood 1¾-yd. Model 900, diesel powered.
Lorain 55, 1-yd. shovel.
Lorain 40 truck crane on Mack 10-wheeler. Reconditioned.
Unit 1020, ½-yd. gasoline crawler shovel

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Sanderson-Cyclone No. 42 well drill, new.
Sanderson-Cyclone No. 44 well drill, new.
Bits—Stems—Bailers—Sockets, Etc.

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2—45" Ohio lifting magnets, rebuilt.
1—36" lifting magnet, rebuilt.

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1½ KW to 125 KW, alternating and direct current, gasoline and diesel powered.

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500 cu. ft. Gardner-Denver deisel, rebuilt.
105 cu. ft. Schramm gas powered on 4 steel wheels.
Worthington two-stage, water-cooled, vertical 250#, 60 CFM, new condition.

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Phone **Harrisburg 7-3431**

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PARTS FOR SAME

One set Concaves—New
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One Extra Shaft—Good
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One used Excentric—Good
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One Extra Drive Shaft & Pinion—Good
One set Mantles—Good
One set Excentric Bolts (long)
One Excentric Gear—New

We offer the No. 6-K-6375 for $4500.00 and the No. 8-L-4898 for $7500.00, (all spare parts included) f.o.b. cars or truck, our plant, Cape Girardeau, Missouri. Subject to prior sale and delivery can be made after January 1st, 1953.

THE FEDERAL MATERIALS CO. CAPE GIRARDEAU, MISSOURI

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CLASSIFIED ADVERTISING IN CONCRETE PRODUCTS SECTION

ABSOLUTE PUBLIC AUCTION

SINGLE LOTS ONLY — NO CONFIRMATION NECESSARY

MACHINERY and EQUIPMENT of $2,000,000.00 CHEMICAL PLANT

By Order of Owners 1348 BLOCK STREET, BALTIMORE, MD. *on the premises*

THURSDAY, DEC. 4, 1952 AT 10:00 A.M. (E.S.T.)

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4—7' ID x 60' long Kilns complete, ALL WELDED, 9/16" shells, Timken bearing rolls, firing hoods, gear reducer and motor drives. One equipped with Manitowoc Recuperator.
1—5'6" x 31'.
1—4'6" ID x 36', brick lined, incl. motor drive.

ROTARY DRYERS

1—96" x 54', ½" shell, Timken rolls, burner, gear reducer and motor drive, exhauster, etc.
1—72" x 40', oil fired, gear reducer and motor.
1—Small Portable Dryer, on self contained base.

ROTARY VACUUM FILTERS

1—4'6x6' FEINC, string discharge.
1—8'x12' Oliver, acid proof, lead and rubber constructon.

APRON or PAN CONVEYORS

2—24" x 51' c.c.
1—24" x 84' c.c.
1—12" x 18' c.c.

BOILER

1—404 HP Springfield Water Tube BOILER, 225# w.p. ASME Code, Boiler #3112.

MOTORS

251 Electric Motors, all 3/60/220V, ½ HP to 100 HP.

GEAR REDUCERS

66 Gear Reduction Units.

SCREW CONVEYORS

2451 Feet steel encased, 4", 6", 7", 8", 9" and 12" dia. Most lengths motor driven.
Only non-corrosive materials handled.

BUCKET ELEVATORS

19—Steel encased, from 16' to 74' c.c., 6x4, 8x5, 14x7 buckets.

Only non-corrosive materials handled.

TANKS

120—Steel Bins, Hoppers, Storage Tanks, all ¼" and heavier plate; some open top, rectangular; some V-shaped; and closed, horizontal; mostly welded construction.

KETTLES

4—6500 gal. vertical, closed, jacketed, agitated Kettles, 100# w. p., V-belt driven.

STRUCTURAL STEEL

Approx. 500 Tons Structural Steel.

MISCELLANEOUS

1—4 Ton Shepard Niles Monorail Crane, complete with motors, controls, and bucket; also 100 Tons structural steel monorail supports.
1—Dorr Classifier, Duplex 6'x20'.
1—Dorr Thickener, 18' dia. x 22'.
5—Vacuum Pumps, 94, 196, 400 CFM, also Nash size 4.
4—Fuller Lehigh Pulverizers, each driven by 75 HP vertical motor.
3—4' x 5' #38 Tyler Hummer Screens.
5—Fuller-Kinyon Air Compressors.
1—Jeffrey Traylor Vibrating Grizzly.
2—Jaw Crushers, 10" x 16" Buchanan Type B, 10" x 14" Farrel.
1—Pneumatic Airveying System, including 225' of 3" pipe and hoppers.
4—Buffalo Weigh Hoppers, 4' dia. with suspension scales.
1—Rotary Batch Blender 66 cu. ft., capacity 4100#.
1—Vertical Lime Kiln about 30' high.
1—Cottrell Precipitator.
1—Rotary Lime Slaker 6'6" ID X 12' long.
1—18" x 85' Belt Conveyor.
32—Centrifugal Pumps, various sizes, including two Dorrco.

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Open 16" bucket elevator 90'
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Cont. 12" and 14" bucket elevator, steel frame
Two Merrick scales for 16" & 30" belt
Bartlett-Snow revolving dryer, 3' x 17'
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Sullivan HE 7½ hp. electric hoist
Three overhead electric hoists
Chicago 3 ton airhoist, size 12
Double drum Tandem hoist.
Sturtevant 00 Fine crusher, 2 hp. motor
Gruendler 2XA pulverizer, 14" x 14½" feed
Jeffrey type A swing hammer pulverizer
Stedman B-30 hammermill, 30" x 24"
Pa. hammermill SXT-8 with 125 hp motor
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Power & Mining double roll crusher, 24" dia. x 14"
Bonded Scale Cinder crusher, 12" x 16"
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Apron conveyors; 24" x 46" and 30" x 33'
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New and used conveyor belt
Vertical hydraulic press, 250 tons.

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10'x90'x9/16" Allis-Chalmers.
8'x80'x⅜" Vulcan.
7'x160'x⅝" & ¾" (2).
7'6" & 6'6"x120'x⅝".
7'x120'x⅝".
7'x60'x⅜" with lifters.
6'x27' Louisville, 4½" SS tubes.
502-20 Roto-Louvre.
5'x30'x⅜" Ruggles Cole.
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5'x22' Smidth, Tube.
23"x12' double shaft, L. B. Pug.
10'x48" Hardinge.

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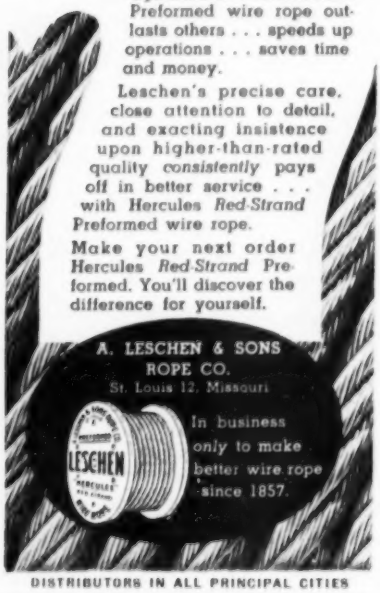

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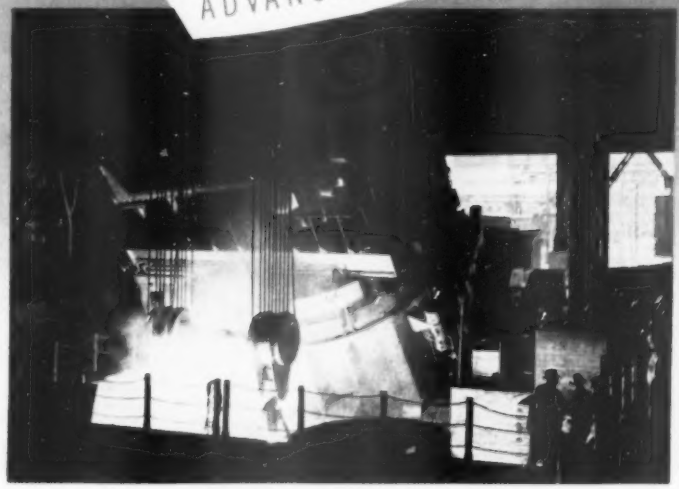

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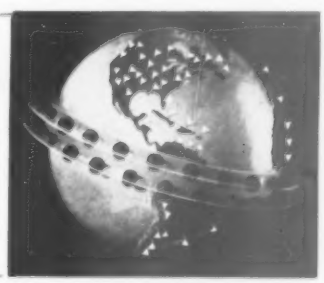

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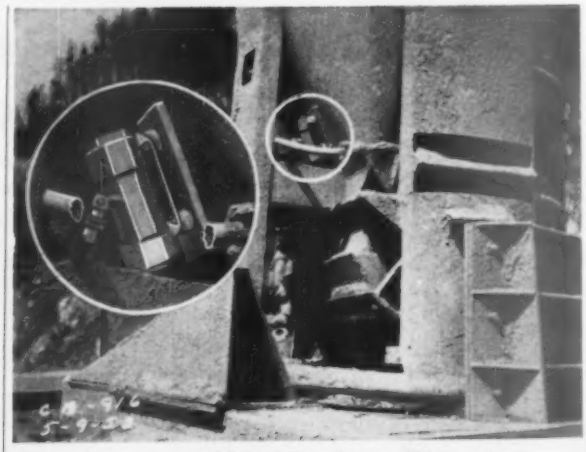

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